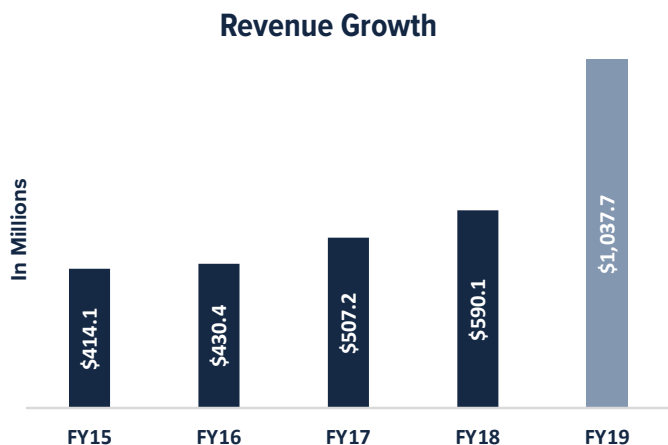


ANNUAL REPORT **2019**



Dear Fellow Stakeholders,

Fiscal 2019 was a transformative year for our company. We completed the acquisition of KMG Chemicals (“KMG”), which nearly doubled our revenue and number of employees as well as significantly broadened our product portfolio, industry participation, and geographic reach. The acquisition, the largest in our company’s history, helped drive another year of record results as we recorded revenue growth for the fourth consecutive year.



To support our broader business portfolio, we also introduced a new reporting structure, which includes two segments: Electronic Materials and Performance Materials.

The Electronic Materials segment is composed of our heritage CMP slurries and polishing pads businesses as well as the acquired KMG electronic chemicals business, and accounts for approximately 80% of our company’s revenue. The addition of the electronic chemicals business expanded our offering of the electronic materials, strengthening our position as a preferred materials supplier to the semiconductor industry. Despite a soft overall semiconductor industry demand environment in fiscal 2019, we were able to deliver growth on a reported and pro forma basis, driven by growth in electronic chemicals and CMP pads. Going forward, we continue to believe that we are well positioned for growth, and see a bright future for advanced materials given emerging demand drivers including 5G, virtual reality, internet of things, artificial intelligence, big data, industrial automation and autonomous vehicles.

Our Performance Materials segment, which consists of the acquired KMG pipeline performance and wood treatment businesses, as well as our legacy QED business, provides growth opportunities beyond the semiconductor industry and has positioned us as a leading supplier of critical materials to pipeline companies. During the year, this segment reported robust growth due to increased demand for pipeline performance products, primarily drag reducing agents (DRAs), which account for the majority of this segment. We are excited about continued growth in DRAs and are investing in additional manufacturing capacity to capitalize on customer opportunities both domestically and internationally.

During the year, we continued to generate strong free cash flow, driven by our best-in-class profitability and capital-light business model. We returned cash to our stockholders through dividends and share repurchases, and prepaid approximately \$100 million of debt to deleverage our balance sheet following the acquisition. We also invested \$56 million of capital expenditures back into our businesses to support future growth.

Looking forward, we are excited about the future for our company as we are optimistic about our ability to continue to grow above the industries in which we participate as well as to drive profitability to even higher levels. Fiscal 2020 will be a year of investment to support additional future growth for our company, particularly in pipeline solutions. During our Investor Day in June 2019, we presented long-term financial targets that highlight robust growth expectations for fiscal years 2020-2024, including 6% to 8% CAGR for total revenue and an EBITDA margin of 35%.

Financial Highlights

In Millions	FY19	FY18
Revenue	\$1,037.7	\$590.1
Adjusted EBITDA	\$333.4	\$189.9
Adjusted EBITDA Margin	32.1%	32.2%

Adjusted EBITDA and Adjusted EBITDA Margin are considered non-GAAP financial measures by the U.S. Securities and Exchange Commission (SEC). Reconciliation of GAAP Net Income to Adjusted EBITDA and Adjusted EBITDA Margin can be found in our November 18, 2019 current report on Form 8-K.

We remain focused on delivering value to our customers through robust product solutions and superior attention to quality, which we believe continues to position us as the premier supplier of critical materials to the industries we serve.

In closing, I would like to sincerely thank our stockholders, customers and employees for your continued support of our company.

Sincerely,

David H. Li
President and Chief Executive Officer



UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549
FORM 10-K
ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE
SECURITIES EXCHANGE ACT OF 1934

FOR THE FISCAL YEAR ENDED SEPTEMBER 30, 2019

or

TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES
EXCHANGE ACT OF 1934

For the transition period from _____ to _____

COMMISSION FILE NUMBER 000-30205

CABOT MICROELECTRONICS CORPORATION

(Exact name of registrant as specified in its charter)

Delaware

(State of Incorporation)

870 North Commons Drive

Aurora, Illinois

(Address of principal executive offices)

36-4324765

(I.R.S. Employer Identification No.)

60504

(Zip Code)

Registrant's telephone number, including area code: **(630) 375-6631**

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Stock, \$0.001 par value	CCMP	The NASDAQ Stock Market LLC

Securities registered pursuant to Section 12(g) of the Act: None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes No

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes No

Indicate by check mark whether the registrant: (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes No

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (Section 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes No

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See definition of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer Accelerated filer Non-accelerated filer Smaller reporting company Emerging growth company

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act.

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act). Yes No

The aggregate market value of the registrant's Common Stock held beneficially or of record by stockholders who are not affiliates of the registrant, based upon the closing price of the Common Stock on March 31, 2019, as reported by the NASDAQ Global Select Market, was approximately \$3,221,306,626. For the purposes hereof, "affiliates" include all executive officers and directors of the registrant.

As of October 31, 2019, the Company had 29,104,190 shares of Common Stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's definitive Proxy Statement for the Annual Meeting of Stockholders to be held on March 4, 2020, are incorporated by reference in Part III of this Annual Report on Form 10-K to the extent stated herein.

This Annual Report on Form 10-K includes statements that constitute "forward-looking statements" within the meaning of federal securities regulations. For more detail regarding "forward-looking statements" see Item 7 of Part II of this Annual Report on Form 10-K.

CABOT MICROELECTRONICS CORPORATION
FORM 10-K
FOR THE FISCAL YEAR ENDED SEPTEMBER 30, 2019

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PART I

ITEM 1. BUSINESS

OUR COMPANY

Cabot Microelectronics Corporation ("Cabot Microelectronics", "the Company", "us", "we", or "our"), which was incorporated in the state of Delaware in 1999, is a leading global supplier of consumable materials to semiconductor manufacturers and pipeline and adjacent industry customers. On November 15, 2018 ("Acquisition Date"), we completed our acquisition of KMG Chemicals, Inc. ("KMG"), which produces and distributes specialty chemicals and performance materials for the semiconductor industry, pipeline and adjacent industries, and industrial wood preservation industry ("Acquisition"). The Acquisition extended and strengthened our position as one of the leading suppliers of consumable materials to the semiconductor industry and expanded our portfolio with the addition of KMG's electronic chemicals and performance materials businesses, the latter of which we believe enables us to be a leading global provider of performance products and services to customers in pipeline and adjacent industries.

Subsequent to the Acquisition, we have operated our business within two reportable segments: Electronic Materials and Performance Materials. The Electronic Materials segment consists of our heritage chemical mechanical planarization (CMP) slurries and polishing pads businesses, as well as the KMG's heritage electronic chemicals business. In our Electronic Materials segment, we serve customers in the semiconductor industry across the United States, Europe and Asia, and are the leading global supplier of CMP slurries, and a leading global supplier of electronic chemicals (also known as "high-purity process chemicals"), and CMP pads. We develop, produce, and sell CMP slurries for polishing many of the conducting, insulating and isolating materials used in integrated circuit (IC) devices, and for polishing the disk substrates and magnetic heads used in hard disk drives. We also develop, manufacture, and sell CMP polishing pads, which are used in conjunction with slurries in the CMP process. In our electronic chemicals business, we produce and sell high-purity process chemicals through the formulation, purification, and blending of acids, solvents, and other wet chemicals used to etch and clean silicon wafers in the production of semiconductors, photovoltaics (solar cells), and flat panel displays.

Our Performance Materials segment includes KMG's heritage pipeline performance and wood treatment businesses, and our heritage QED business. We are a leading global provider of products, services, and solutions for optimizing pipeline throughput and maximizing performance and safety. Our pipeline performance products include drag-reducing agents ("DRAs"), valve lubricants, cleaners and sealants, and related equipment supporting pipeline and adjacent industries. We also provide routine and emergency maintenance services as well as training for customers in the pipeline and adjacent industries worldwide. Through KMG's subsidiary, KMG-Bernuth, Inc. (KMG-Bernuth), we manufacture and sell our wood treatment preservatives, based on pentachlorophenol ("penta"), to wood treatment customers who use these products to extend the useful life of wood utility poles and crossarms, but we recently have announced that we intend to no longer invest in this business and will not construct a new consolidated manufacturing facility when we close the two existing facilities by the end of 2021. See below, and Note 10 of "Notes to the Consolidated Financial Statements" included in Item 8 of Part II of this Annual Report on Form 10-K. In our QED business, we serve the precision optics industry with capital equipment, consumables and services. For additional information on our segment reporting, refer to Note 22 of "Notes to the Consolidated Financial Statements" included in Item 8 of Part II of this Annual Report on Form 10-K.

ELECTRONIC MATERIALS:

IC DEVICE MANUFACTURING

IC devices, or "chips", are components in a wide range of electronic systems for computing, communications, manufacturing and transportation. Consumers most frequently encounter IC devices in mobile internet devices (MIDs) such as smart phones and tablets, microprocessors, application processors and memory chips in their desktop or laptop computers, and in automotive applications, gaming devices, and digital televisions. The multi-step manufacturing process for IC devices typically begins with a circular wafer of pure silicon, with the first manufacturing step referred to as a "wafer start". Many identical IC devices, or dies, are manufactured on each wafer at the same time. The initial steps in the manufacturing process build transistors and other electronic components on the silicon wafer. These components are isolated from each other using a layer of insulating material, most often silicon dioxide, to prevent electrical signals from bridging from one transistor to another. These components are then wired together using conducting materials such as aluminum or copper in a particular sequence to produce a functional IC device with specific characteristics. Once the conducting wiring on one layer of the IC device is completed, another layer of insulating material is added. The process of alternating insulating and conducting layers is repeated until the desired wiring within the IC device is achieved. At the end of the process, the wafer is cut into the individual dies, which are then packaged to form individual chips.

CMP SLURRIES AND PADS

Demand for CMP consumables products, including slurries and pads, used in the production of IC devices is primarily based on the number of wafer starts by semiconductor manufacturers and the type and complexity of the IC devices they produce. To enhance the performance of IC devices, IC device manufacturers have progressively increased the number and density of electronic components and wiring layers in each IC device. This is typically done in conjunction with shrinking the key dimensions on an IC device from one technology generation, or "node," to another. As a result, the number of transistors, wires and discrete wiring layers have increased, increasing the complexity of the IC device and the related demand for CMP consumables products. Furthermore, as semiconductor technology has advanced and performance requirements of IC devices have increased, the percentage of IC devices that utilize CMP in the manufacturing process has increased steadily over time. We believe that CMP is used in most IC devices made today, and we expect that the use of CMP will continue to increase in the future.

In the CMP polishing process, CMP consumables are used to remove excess material that is deposited during the IC manufacturing process, and to level and smooth the surfaces of the layers of IC devices, via a combination of chemical reactions and mechanical abrasion, leaving minimal residue and defects on the surface, with only the material necessary for circuit integrity remaining. CMP slurries are liquid solutions generally composed of high-purity deionized water and a proprietary mix of chemical additives and engineered abrasives that chemically and mechanically interact at an atomic level with the surface material on the wafer. CMP pads are engineered polymeric materials designed to distribute and transport the slurry to the surface of the wafer and distribute it evenly across the wafer. Grooves are formed into the surface of the pad to facilitate distribution of the slurry. The CMP process is performed on a CMP polishing tool. During the CMP process, the wafer is held on a rotating carrier, which is pressed down against a CMP pad. The CMP pad is attached to a rotating polishing table that spins in a circular motion in the opposite direction from the rotating wafer carrier. A CMP slurry is continuously applied to the polishing pad to facilitate and enhance the polishing process. Hard disk drive and silicon wafer manufacturers use similar processes to smooth the surface of substrate disks.

An effective CMP process is achieved through technical optimization of the CMP consumables in conjunction with an appropriately designed CMP process. Prior to introducing new or different CMP slurries or pads into its manufacturing process, an IC device manufacturer generally requires the product to be qualified in its processes through an extensive series of tests and evaluations. These qualifications are intended to confirm that the CMP consumable product will function properly within the customer's overall manufacturing process. These tests and evaluations may require minor changes to the CMP process or the CMP slurry or pad. While this qualification process varies depending on numerous factors, it is generally quite costly and may take six months or longer to complete. IC device manufacturers usually assess the cost, time required, and impact on production when they consider implementing or switching to a new CMP slurry or pad.

CMP enables IC device manufacturers to produce smaller, faster and more complex IC devices with a greater density of transistors and other electronic components. With smaller IC devices, IC device manufacturers can increase the number of IC devices that fit on a wafer, which increases their throughput, or the number of IC devices that can be manufactured in a given time period. CMP also helps reduce the number of defective or substandard IC devices produced, which increases the device yield. Producing more complex and higher performing IC devices increases the value of the wafers processed. Improvements in throughput, yield and value per wafer improve the return on an IC device manufacturer's significant investment in manufacturing capacity, which is a high priority. More broadly, sustained growth in the semiconductor industry traditionally has been fueled by enhanced performance and lower unit costs, making IC devices more affordable in an expanding range of applications. We believe CMP remains a critical process in leading-edge semiconductor technology, enabling IC device manufacturers to efficiently produce complex chips, particularly where higher performance may now be accompanied by higher unit costs.

ELECTRONIC CHEMICALS

Through our electronic chemicals business, we formulate, purify and blend acids, solvents and other wet chemicals used to etch and clean silicon wafers in the production of semiconductors, photovoltaics (solar cells) and flat panel displays. Our products include sulfuric, phosphoric, nitric and hydrofluoric acids, ammonium hydroxide, hydrogen peroxide, isopropyl alcohol, other specialty organic solvents and various blends of chemicals. Our customers rely on us to provide products with very low levels of contaminants and particles. We purchase raw material chemicals from various suppliers and at our facilities blend, purify and package them for distribution to our customers. We are responsible for product purity levels and analytical testing, and in our view, our ability to maintain high purity levels throughout the supply chain process is a competitive advantage. We believe the production of high-purity process chemicals is critical to our customers' businesses, as they demand an increasing level of purity to enable more advanced technology nodes and increase yields. We believe demand for electronic chemicals will continue to increase as the semiconductor industry migrates to smaller nodes, which require additional processing steps.

PERFORMANCE MATERIALS:

PIPELINE PERFORMANCE PRODUCTS; DRAG REDUCING AGENTS ("DRAs")

Through the Acquisition, we acquired KMG's pipeline performance business, which has enabled us to become a leading global provider of performance products and services to pipeline companies. Through this business, we supply DRAs, valve lubricants, cleaners and sealants, and related services and equipment, including routine and emergency valve maintenance services and training, to customers in the pipeline and adjacent industries. Our pipeline performance products and services provide value-added specialty products that optimize pipeline efficiency, lower operating costs, and enhance safety. Through the Acquisition, we acquired KMG's pipeline performance business, which includes the DRA business operated through Flowchem LLC ("Flowchem"), a wholly-owned subsidiary of KMG, as well the valve lubricants and related services businesses. We operate facilities for the manufacture, formulation and distribution of our pipeline performance products in the United States and Canada. We believe demand for DRAs is driven by both production levels within current pipeline infrastructure, as well as future additional pipeline capacity coming online. In our view, aging of existing pipeline infrastructure should create additional demand, as DRAs allow pipeline customers to maximize throughput while meeting maximum pipeline pressure regulations.

WOOD TREATMENT

In the wood treatment preservatives business, KMG-Bernuth supplies penta to industrial customers who use this preservative to pressure treat wood products, primarily utility poles and crossarms, to extend their useful life by protecting against insect damage and decay. Early in the fourth quarter of fiscal 2019, we had announced that, as a result of the Mexican government's required compliance with certain international environmental regulations and the resulting requirement that KMG-Bernuth cease producing penta in Mexico by the end of 2021, we planned to close both the Matamoros, Mexico and Tuscaloosa, Alabama facilities by such time, with the intention to consolidate operations in a new plant. However, later in the fourth quarter of fiscal year 2019, as we assessed our capital expenditure priorities for fiscal year 2020 and beyond, we made a decision to further focus our future capital investments on our high-growth core businesses, such as pipeline performance products, CMP slurries and pads and electronic chemicals. As a result, we also decided to cease future investment in the wood treatment business and to not construct a new production facility to replace current operations in Matamoros and Tuscaloosa. In the interim, prior to the closure of the Matamoros and Tuscaloosa facilities, we intend to continue to operate the existing facilities and provide our customers with quality penta products to treat and extend the useful life of wood utility poles and crossarms. We are considering various options regarding this business. See Note 9 and Note 10 of "Notes to the Consolidated Financial Statements" included in Item 8 of Part II of this Annual Report on Form 10-K.

PRECISION OPTICS

Our wholly-owned subsidiary, QED Technologies International, Inc. (QED), is a leading provider of deterministic finishing and advanced measurement technology for the precision optics industry. Many of the production processes currently used in precision machining and polishing have been based on traditional, labor-intensive techniques, which are being replaced by computer-controlled, deterministic processes. Through our QED subsidiary, we are applying our technical expertise in polishing techniques to demanding applications in other industries where shaping, enabling, and enhancing the performance of surfaces is critical to success, such as for precision optics. We believe precision optics are pervasive, serving several large existing industries such as semiconductor equipment, aerospace, defense, biomedical, research and digital imaging.

OUR PRODUCTS

ELECTRONIC MATERIALS

CMP CONSUMABLES FOR IC DEVICES AND FOR SUBSTRATE MATERIALS

We develop, produce and sell CMP slurries for polishing a wide range of materials that conduct electrical signals, including tungsten, copper, tantalum (commonly referred to as "barrier"), which is used in copper wiring applications, and aluminum. Slurries for polishing tungsten are used in essentially all chip manufacturing processes containing CMP, with growth driven by increased utilization and higher performance demands in advanced logic, DRAM and 3D NAND devices. Tungsten slurries are also used in advanced logic devices for a multitude of end use applications including MIDs such as smart phones and tablets, gaming devices, and in high-performance computing and artificial intelligence, as well as in legacy logic applications such as those used in automobiles and connected communication devices. In addition, Tungsten slurries are also used in some of the most advanced technologies, such as 3D memory and FinFET for advanced logic IC devices. Slurries for polishing copper and barrier materials are used in the production of advanced IC logic devices such as microprocessors for computers, and devices for graphic systems, gaming systems and communication devices, as well as in the production of advanced memory devices. These products include different slurries for polishing the copper film and the thin barrier layer used to separate copper from the adjacent insulating material. Slurries for polishing aluminum are used in certain advanced transistor gate structures. We offer multiple products for each technology node to enable different integration schemes depending on specific customer needs.

We also develop, manufacture and sell slurry products used to polish the dielectric insulating materials that separate conductive layers within logic and memory IC devices. Some of our slurry products for these materials are used in mature, high volume polishing applications called Interlayer Dielectric, or ILD, in the production of both logic and memory devices. Our more advanced dielectrics products are designed to deliver higher throughput, improved defectivity, and lower cost of ownership than required in traditional ILD applications, as well as to meet the more stringent and complex performance requirements of lower-volume, more specialized dielectrics polishing applications at advanced technology nodes. Some of the applications for advanced dielectrics slurries include shallow trench isolation (STI), "stop on poly" or "stop on nitride" isolation, bulk oxide polishing, and polishing of various dielectrics in advanced transistor designs.

We develop, produce and sell CMP polishing pads, which are consumable materials that work in conjunction with CMP slurries in the CMP polishing process. We believe that CMP polishing pads represent a natural adjacency to our CMP slurry business, since both technologies are required by our customers to deliver their intended result and utilize the same technical and sales infrastructure. Our polishing pad product portfolio includes pads utilizing both thermoset and thermoplastic polyurethane pad material. We produce and sell pads that can be used on a variety of polishing tools, over a range of applications, including tungsten, copper, and dielectrics, over a range of technology nodes, and on both 300mm and 200mm wafers.

In addition, we develop, produce and sell CMP slurries for polishing certain substrate related materials that are used in the production of hard disks and IC devices used in various electronics applications, which represent an extension of our core CMP slurry technology and manufacturing capabilities established for the semiconductor industry. We believe CMP significantly improves the surface finish of these substrates, resulting in better performance, such as greater storage capacity, higher speed or better power efficiency, of electronics and their applications.

ELECTRONIC CHEMICALS PRODUCTS FOR IC DEVICES AND FOR SUBSTRATE MATERIALS

Our electronic chemicals products include sulfuric, phosphoric, nitric and hydrofluoric acids, ammonium hydroxide, hydrogen peroxide, isopropyl alcohol, other specialty organic solvents and various blends of chemicals. These products are used in multiple process steps throughout the semiconductor fab. Customers demand an increasing level of purity to enable more advanced technology nodes and increase yields. Our electronic chemicals products currently have purity levels up to 20 parts per trillion levels.

PERFORMANCE MATERIALS

PIPELINE PRODUCTS

In our Flowchem business, we provide polymer-based DRAs for light, medium, and heavy crude oil transmission. We have several product offerings to meet specific customer needs depending on the physical properties of the crude being pumped and various geographic climate conditions. Our products provide benefit by reducing the pressure loss in a pipeline due to the turbulent flow. This allows pipeline operators to maximize product flow while maintaining safe operating pressure and reducing energy consumption.

In our Valve Products and Services business, we develop, manufacture, and sell products used for maintaining and extending the operational lifespan of lubricated isolation valves. We also service valves inline and under pressure through our field services division, and provide accredited training to customers in the pipeline and adjacent industries globally.

WOOD TREATMENT PRODUCTS

Penta products include solid blocks and concentrated solutions. The solid penta blocks are manufactured at our facility in Matamoros, Mexico. DT-40 (penta concentrate liquid) is processed at KMG-Bernuth's plant in Tuscaloosa, Alabama. See above and below, and Note 9 and Note 10 of "Notes to the Consolidated Financial Statements" included in Item 8 of Part II of this Annual Report on Form 10-K regarding our decision to cease future investment in the wood treatment business and to not construct a new production facility to replace current operations in Matamoros and Tuscaloosa.

PRECISION OPTICS PRODUCTS

Through QED, we design and produce precision polishing and metrology systems for advanced optics applications that allow customers to attain near-perfect shape and surface finish on a range of optical components such as mirrors, lenses and prisms. QED's polishing systems use Magneto-Rheological Finishing (MRF™), a proprietary surface figuring and finishing technology that employs magnetic fluids and sophisticated computer technology to polish a variety of shapes and materials. QED's metrology systems use proprietary Subaperture Stitching Interferometry (SSI) technology, which captures precise metrology data for large and/or strongly curved optical parts. QED's products also include MR polishing fluids, consumables, spare and replacement parts, as well as optical polishing services and other customer support services.

STRATEGY

We collaborate closely with our customers to develop and manufacture products that offer innovative and reliable solutions to our customers' challenges, and we strive to consistently and reliably deliver and support these products around the world through what we believe is a robust global infrastructure and supply chain. We continue to focus on the execution of our primary strategies related to technology leadership, customer collaboration, and supply chain excellence.

STRENGTHENING AND GROWING OUR ELECTRONIC MATERIALS BUSINESS

Delivering Innovative and High-Performing Solutions: We believe that technology and innovation are vital to success in our Electronic Materials business, primarily in the area of CMP consumables, and we devote significant resources to research and development. We focus our research and development activity to deliver innovative CMP consumables products for advanced applications for our technology-leading customers.

We believe an example of our ability to deliver innovative products for advanced applications is the revenue generated from our tungsten and dielectrics slurry products used in 3D memory and tungsten slurry products for FinFET in advanced logic, as well as growth in revenue from our CMP pads products. We believe our focused effort on advanced technologies with technology-leading customers will enable us to provide more compelling new products as technology continues to advance. In addition, we believe our CMP pads product area represents a promising opportunity for continued growth. We believe that our array of pad technology and products enables us to better serve the needs of our customers on a global basis, including the ability to offer performance-differentiated CMP slurry and pad consumable sets. For our electronic chemicals products, we believe increasing levels of purity and achieving lower levels of variation are required to enable these next-generation IC technologies. We continue to work to develop industry leading metrology methods to measure the purity levels achieved.

Close Collaboration with Our Customers: We believe that building close relationships with our customers is essential to achieving long-term success in our business. We collaborate with our customers to identify and deliver new and improved CMP solutions, to integrate our products into their manufacturing processes, and to assist them with supply, warehouse and inventory management. Our customers demand a highly reliable supply source, and we believe we have a competitive advantage because of our ability to timely deliver high-quality products and service from the early stages of product development through the high-volume commercial use of our products. We have strategically located our research and development and clean room facilities, manufacturing operations, and related technical and customer support teams to be responsive to our customers' needs, and believe they provide us with a competitive advantage. These facilities are located in the United States, South Korea, Japan, Taiwan, Singapore, France, Italy, and the United Kingdom.

We believe the several supplier excellence awards we have received from our customers over the past decade, which recognize our product quality and reliability, technology leadership, and customer support capabilities, are evidence of our commitment to, and success in, delivering high-performing and high-quality products to our customers through close collaboration with them. Our global business teams are focused on a range of projects with our customers to address specific business opportunities for advanced technologies.

Robust Manufacturing Process and Global Supply Chain. We believe that product and supply chain quality are critical to success in our business. Our customers demand continuous improvement in the performance of our products, in terms of product quality and consistency. Thus, we strive to reduce variation in our products and processes in order to increase quality, productivity and efficiency, and improve the uniformity and consistency of performance of our CMP consumables and high-purity electronic chemicals products. Variability reduction becomes more important to our customers as technology advances. Our global manufacturing sites are managed to provide the people, training and systems needed to support stringent industry demands for product quality. To support our quality initiative, we use Six Sigma, a systematic, data-driven approach and methodology for improving quality by reducing variability, across our Company. We believe our use of Six Sigma has contributed to lower variability in our products and sustained improvement in productivity in our operations.

We also believe that continuous improvement and variation reduction in our global supply chain are critical to our success and the success of our customers. We believe our capabilities in supply chain management and quality systems differentiate us from our competitors, and that our worldwide CMP consumables manufacturing plants and global network of suppliers also provide supply chain flexibility as needed.

EXPANDING OUR PERFORMANCE MATERIALS BUSINESS

Delivering High Quality Pipeline Product: For our DRA business, our Flowchem subsidiary focuses on providing superior customer service to our customers while delivering consistent, high quality DRA products at a competitive price. We intend to continue to serve current customers as they bring new capacity online and to grow our business through attracting and serving new customers. In addition, we continue to develop other products focused on the pipeline transmission area for which DRAs can serve currently unmet needs.

In our Valves Products and Services business, we continue to work to drive demand for our products by promoting valve best practices to energy industry operators that align with current and trending global regulations. Our primary focus is the promotion of our high-margin critical sealing products as an alternative to more costly mechanical solutions for achieving isolation in aged infrastructure.

Wood Treatment Transition: Early in the fourth quarter of fiscal 2019, we had announced that, as a result of the Mexican government's required compliance with certain international environmental regulations and the resulting requirement that KMG-Bernuth cease producing penta in Mexico by the end of 2021, we planned to close both the Matamoros, Mexico and Tuscaloosa, Alabama facilities by such time, with the intention to consolidate operations in a new plant. However, later in the fourth quarter of fiscal year 2019, as we assessed our capital expenditure priorities for fiscal year 2020 and beyond, we made a decision to further focus our future capital investments on high-growth core businesses, such as pipeline performance products, CMP slurries and pads and electronic chemicals. As a result, we also decided to cease future investment in the wood treatment business and to not construct a new production facility to replace operations in Matamoros and Tuscaloosa. In the interim, prior to the closure of the Matamoros and Tuscaloosa facilities by the end of 2021, we intend to continue to operate the existing facilities and provide our customers with quality penta products to treat and extend the useful life of wood utility poles and crossarms. We are considering various options regarding this business. See above and below and Note 10 of "Notes to the Consolidated Financial Statements" included in Item 8 of Part II of this Annual Report on Form 10-K.

Driving Demand for Precision Optics:

Through our QED subsidiary, we develop and provide products for demanding polishing applications for precision optics, and QED continues to be the technology leader in deterministic finishing in the industry. QED's polishing and metrology technology enables customers to replace manual processes with automated solutions that provide more precise and repeatable results.

INDUSTRY TRENDS

SEMICONDUCTOR INDUSTRY

We believe the semiconductor industry continues to exhibit various trends. Demand within the semiconductor industry is driven by MIDs, personal computers (PCs), and a wide range of other electronic applications including high-performance computing and artificial intelligence. The semiconductor industry has shown fluctuation in the overall industry demand, as a result of numerous factors, including changing mix of demand drivers, semiconductor fab utilization, pressure to reduce costs, and slower pace of technology advancement.

We have discussed the significant shift in semiconductor industry demand over the past several years from IC devices for PCs to MIDs. Demand for MIDs is largely consumer-based, versus more enterprise-based demand for PCs, and this shift introduced fluctuations in semiconductor industry demand, along with various macroeconomic and geopolitical conditions. There are several factors that could drive future industry growth, such as the: ongoing transition from traditional planar, or 2D, memory to advanced 3D memory for mobile, server, and PC applications; expected need for advanced semiconductor devices for high performance computing, virtual and augmented reality, smart phone applications, artificial intelligence, and 5G; demand for greater connectivity with wearables, peripherals, and the internet of things; increased semiconductor content in automobiles; and semiconductor industry development in China. While demand conditions may fluctuate, and periodically be softer, which we experienced in fiscal year 2019, we continue to believe that semiconductor industry demand will grow over the long term based on increased usage of IC devices in existing applications, as well as future applications.

Over the past several years, we have seen the customer base within the semiconductor industry consolidate as larger semiconductor manufacturers have generally grown faster than smaller ones, through mergers and acquisitions as well as through alliances among and between different companies. Costs to achieve the required scale in manufacturing within the semiconductor industry continue to rise, along with the related costs of research and development, and larger manufacturers generally have greater access to the resources necessary to manage their businesses. This trend is particularly evident in capital spending within the industry, as the largest semiconductor companies account for an increasingly large portion of total capital spending in the industry compared to the past.

As demand for more advanced and lower cost electronic devices grows, there is continued pressure on IC device manufacturers to reduce their costs. Many manufacturers reduce costs by pursuing ever-increasing scale in their operations, while seeking to reduce their production costs by increasing their production yields, regardless of their scale. Thus, they look for electronic materials products, such as CMP consumables and electronic chemicals products, with quality and performance attributes that can help them reduce their overall cost of ownership, pursue ways to use smaller amounts of CMP materials, and aggressively pursue price reductions for these materials. Electronic chemicals products also require increased levels of purity and, like CMP consumables products, lower levels of variation, which contributes to our pursuit of cutting-edge metrology methods to measure purity levels achieved.

Manufacturers also have historically reduced cost, and simultaneously improved device performance, by migrating to smaller technology nodes. However, as the industry continues to shrink dimensions, leading edge technology node transitions are becoming more challenging due to technical and physical obstacles, and the pace of technology change has slowed. To achieve performance and cost improvements, semiconductor manufacturers are placing greater emphasis on new device architectures, including 3D memory and FinFET. Industry commentary suggests that approximately two-thirds of the NAND market has been converted to 3D memory, and while the industry transition is almost complete, we expect additional incremental volume in the memory area associated with more vertical layers. In addition, while during our fiscal 2019 the semiconductor industry experienced weakness in overall DRAM and NAND demand that led to what we believe is a short-term reduction in wafer starts, industry expectations remain that overall demand for these devices, and the related need for increased wafer starts, should continue in the coming years. We believe semiconductor manufacturers will continue to depend upon highly engineered materials in these new architectures, requiring innovative CMP solutions. Further, as wafer starts and the subsequent number of processing steps used on each wafer continue to grow, we see the demand for our high purity electronic chemicals products as also likely to increase.

ELECTRONIC MATERIALS DEMAND

Demand for our CMP consumables and electronic chemicals products is primarily driven by wafer starts, so the electronic materials sector reflects semiconductor industry demand patterns in terms of growth, cyclicalities and seasonality and varying demand for specific device types. Consistent with other participants in the semiconductor industry, we have experienced relatively soft demand conditions in the semiconductor industry starting in our second fiscal quarter of 2019 and continuing past the end of the fiscal year, although some signs of stabilization are becoming apparent. Over the long term, we anticipate worldwide demand for CMP consumables and electronic chemicals used by IC device manufacturers will grow as a result of expected long-term growth in wafer starts, and the trend to more advanced technologies. With respect to CMP consumables, we believe there will continue to be an associated increase in the number of CMP polishing steps required to produce these advanced devices, and the introduction of new materials that are expected to require CMP. With respect to electronic chemicals, we believe there will be increasing demand as customers are requiring a higher level of purity, which requires an increasing number of processing steps used on each wafer. In addition, as customers introduce smaller technology nodes and new architectures, they require higher purity chemicals with fewer and fewer impurities.

We expect the anticipated long-term growth in demand will be partially mitigated by continued efficiency improvements in electronic materials usage as customers seek to reduce their costs. As discussed above, semiconductor manufacturers look for ways to lower the cost of CMP consumables and electronic chemicals in their production operations. As an example, for CMP consumables, these can include customer improvements in technology, dilution of slurry, use of concentrated slurry products, or reduction of slurry flow rate, to reduce the total amount of slurry used, and to extend pad life. In addition, CMP demand also depends upon the specific mix of IC device demand, since the intensity of CMP usage varies by IC device type.

We believe that CMP technical solutions are becoming more complex, with advanced technologies generally requiring greater customization of CMP slurry products by customer, tool set and process integration approach. As a result, we generally see customers selecting suppliers earlier in their development processes and maintaining preferred supplier relationships through production. Therefore, we believe that close collaboration with our customers early in the development cycle offers the best opportunity for optimal CMP solutions. We also believe that research and development programs with customers and suppliers continue to be vital to our success as we develop and commercialize innovative, high-performing and more cost-effective CMP solutions.

PERFORMANCE MATERIALS DEMAND

Pipeline Products and Services

Demand for our pipeline performance products and services may be impacted by changes in the utilities and/or oil and gas industries. Volatility in oil and natural gas prices may impact our customers' activity levels, including production and spending on our pipeline products and services. Expectations about future prices and price volatility are important in determining future spending levels for customers of our pipeline performance products and services. Historically, worldwide oil and natural gas prices and markets have been volatile and may continue to be so in the future. Prices for oil and natural gas are subject to wide fluctuations in response to relatively minor changes in the supply of and demand for oil and natural gas, market uncertainty, and a variety of additional factors that are beyond our control. These factors include, but are not limited to, increases in supplies from United States shale production, international political conditions, including uprisings and political unrest, sovereign debt crises, the domestic and foreign supply of oil and natural gas, the level of consumer demand due to economic growth in countries such as China, weather conditions, domestic and foreign governmental regulations and taxes, the price and availability of alternative fuels, the health of international economic and credit markets, the ability of the members of the Organization of Petroleum Exporting Countries and other state-controlled oil companies to agree upon and maintain oil price and production controls, and general economic conditions.

Wood Treatment

Demand for our wood treatment preservative products, which are used to treat and preserve wood from insect damage and decay, is driven by our customers' demand for utility poles and railroad crossarms, which may be impacted by factors such as infrastructure improvement projects and weather-related events. See above and below, and Note 10 of "Notes to the Consolidated Financial Statements" included in Item 8 of Part II of this Annual Report on Form 10-K, regarding our decision to cease future investment in the wood treatment business and to not construct a new production facility to replace operations in Matamoros and Tuscaloosa.

Precision Optics

Demand for products produced by our QED subsidiary may be impacted by changes in the underlying industries that utilize precision optics, such as semiconductor equipment, aerospace, defense, research, biomedical and digital imaging. Since our primary QED business is the sale of capital equipment, our results may be directly affected by levels of capital spending in these industries. Historically, capital spending is very cyclical, and is impacted by several different factors. These factors include general macroeconomic conditions, government spending and policies, as well as industry-specific trends and dynamics.

COMPETITION

ELECTRONIC MATERIALS

We compete in the semiconductor industry, which is characterized by advances in technology and demanding requirements for product quality and consistency, and lower cost of ownership. We face competition from other suppliers of electronic materials. However, as to our CMP consumables business, we believe we are the world's leading supplier of CMP slurries, and the second largest provider of CMP pads. We believe we continue to be well-positioned to retain and grow our business, and that we have the experience, scale, capabilities and infrastructure that are required for success, as we continue to work closely with technology-leading customers in the semiconductor industry to meet their growing expectations as a trusted business partner.

Our CMP slurry competitors range from small companies that compete with a single product or in a single geographic region, to divisions of global companies with multiple lines of CMP products. In our view, we are the only CMP slurry supplier today that serves a broad range of customers by offering and supporting a full line of CMP slurry solutions for all major applications, with a proven track record of supplying these products globally in high volumes with the requisite high level of technical support services.

With respect to CMP polishing pads, a division of DowDuPont has held the leading position in this area for many years. Several other companies also participate in this area of the CMP consumables business. We believe that our distinctive portfolio of pad technology and products enables us to meet our customers' needs for improved defectivity, greater pad consistency, and longer pad life. In addition, we believe that our full array of polishing pads offerings enables us to better serve our customers on a global basis, including our performance-differentiated slurry and pad consumable sets.

As to electronic chemicals, there are various competitors with whom we compete in different regions. In North America, we believe that we have a significant leadership position, and our principal competitors include Honeywell, Kanto Corporation and Avantor. Outside of the United States, other providers in Europe are BASF, Technic and Honeywell, and in Asia, BASF and Kanto Corporation, among others. We believe our business in Europe is comparable to other providers, and other than in Singapore, at present we do not participate materially in the business in Asia.

PERFORMANCE MATERIALS

In our pipeline performance business, LiquidPower Specialty Products Inc. holds the leading position in DRAs, with Baker Hughes as the other primary provider. For our valve products and services, however, participants include numerous other businesses with none appearing to hold a leadership position.

With respect to our wood treatment business, penta products are and must be registered prior to sale under United States law. See Item 3 of this Annual Report on Form 10-K. As a condition to registration, any company wishing to manufacture and sell these products must provide substantial scientific research and testing data regarding the chemistry and toxicology of the products to the U.S. Environmental Protection Agency ("EPA"). This data must be generated by the applicant, or the applicant must purchase access to the information from other data providers. We believe that the cost of satisfying the data submission requirement serves as an impediment to the entry of new competitors, particularly those with lesser financial resources. While we have no reason to believe that the product registration requirement will be materially modified, we cannot give any assurances as to the effect of such a discontinuation or modification on our business or competitive position.

Our QED subsidiary operates in the precision optics industry. There are few direct competitors of QED and we believe its technology is unique and provides a competitive advantage to customers in the precision optics industry, which still relies heavily on traditional artisanal methods of fabrication.

CUSTOMERS, SALES, AND MARKETING

ELECTRONIC MATERIALS

Within the semiconductor industry, our customers are generally producers of logic or memory IC devices, or providers of IC foundry services. Some logic customers, and so-called "fabless" companies, outsource some or all the production of their devices to foundries, which provide contract manufacturing services, in order to avoid the high cost of process development, construction and operation of a fab, or to provide additional capacity when needed.

We believe the primary influences of our customers' electronic materials buying decisions are: overall cost of ownership, which represents the cost to purchase, use and maintain a product; product quality and consistency; product performance and its impact on a customer's overall yield; engineering support; and, supply assurance. We believe that greater customer expertise within the processes that utilize our CMP consumables and electronic chemicals, more challenging integration schemes, additional and unique polishing materials, and cost pressures will continue to increase demands on suppliers like us.

We use a collaborative approach to build close relationships with our customers in a variety of areas, and we have customer-focused teams in each major geographic region. Our sales process begins long before the actual sale of our products and occurs on numerous levels. Due to the long lead times from research and development to product commercialization and sales, we have research teams that collaborate with technology-leading customers on emerging applications years before the products are required by the market. For CMP consumables, we also have development teams that interact closely with these customers, using our research and development facilities and capabilities to design products tailored to their needs. Next, our applications engineers work with customers to integrate our products into their manufacturing processes. Finally, as part of our sales process, our logistics and sales personnel provide supply, warehouse and inventory management services for our customers, which is also the case for our electronic chemicals customers.

We market our CMP slurry and pad products primarily through direct sales to our customers, although we use distributors in certain areas. We believe this strategy of primarily direct sales provides us an additional means to collaborate with our customers and provides our customers with the most efficient means by which to procure our products.

For our electronic chemicals products, we market through a combination of an internal sales force and distributors organized by geographic region.

PERFORMANCE MATERIALS

Pipeline Products and Services

Through our Flowchem subsidiary, we provide DRAs to several major mid-stream pipeline transmission companies both domestically and internationally. We have a U.S.-based and global sales team, a wholly-owned transportation and logistics company and a network of distributors and agents to manage the sales and delivery of our products. Our main marketing approach is through our membership in industry-based professional organizations, trade shows and publications.

In our Valve Products & Services business, we market and sell to pipeline and adjacent industry customers, such as service companies, and major utility distribution companies via direct sales and channel partners. We actively participate as industry experts in global industry trade shows and forums through technical presentations and white papers.

Wood Treatment

The principal wood preserving chemicals for industrial applications are penta, which is the base for our products, creosote and chromated copper arsenate, or CCA. We only supply penta to customers in the United States and Canada. We do not have other products or business. We are the only manufacturer of penta-based preservatives in North America. Penta is used primarily to treat electric, telephone and other utility poles, to protect them from insect damage and decay, thus extending their useful life by many years. We estimate that approximately two million treated wood utility poles are purchased each year by utility companies in the United States. Of that amount, we estimate approximately 50% are treated with penta. The remaining poles are treated primarily with creosote or CCA.

Precision Optics

Our QED subsidiary supports customers in the semiconductor equipment, aerospace, defense, research, biomedical, and digital imaging industries. QED counts among its worldwide customers leading precision optics manufacturers, major semiconductor original equipment manufacturers, research institutions, and contractors to the United States and other governments.

For additional information on our customers, refer to Note 2 of “Notes to the Consolidated Financial Statements” included in Item 8 of Part II of this Annual Report on Form 10-K.

RESEARCH, DEVELOPMENT AND TECHNICAL

We believe that technology is vital to success in our businesses, primarily in the area of CMP consumables, and we plan to continue to devote significant resources to research, development and technical support (“R&D”), and balance our efforts between shorter and longer-term industry needs. Here, we focus our R&D efforts on product innovation at leading-edge applications for our technology-leading customers. We develop new and enhanced CMP solutions tailored to these customers’ requirements using our expertise in chemical formulation, materials science, product engineering and manufacturing technology. We work closely with these customers at their facilities to identify their specific technology and manufacturing challenges and to translate these challenges into viable CMP process solutions.

Our Research, development and technical efforts are focused on the areas of research related to fundamental CMP technology; development of new and enhanced CMP consumables products, including collaboration on joint development projects with technology-leading customers and suppliers; process development to support rapid and effective commercialization of new products; technical support of our CMP products in our customers’ research, development and manufacturing facilities; and, development of polishing and metrology application outside of the semiconductor industry.

Our research in CMP slurries and pads addresses a breadth of complex and interrelated performance criteria that relate to the functional performance of IC devices, our customers’ manufacturing yields, and their overall cost of ownership. We design slurries and pads that are capable of polishing one or more materials of differing hardness, sometimes at the same time, that comprise the semiconductor circuitry. In addition, our slurries and pads products must achieve the desired surface conditions at high polishing rates, high processing yields and low consumables costs in order to provide acceptable cost of ownership for our customers. Meanwhile, our electronic chemicals products are subject to increased high purity demand to enable more advanced technology nodes and increase yields. These market expectations require us to continue to develop industry leading metrology methods in order to measure the purity levels achieved. As technology advances and materials and designs increase in complexity, these challenges require significant investments in R&D.

We believe that our technology provides us with a competitive advantage, and that our investments in R&D provide us with polishing and metrology capabilities that support the most advanced and challenging customer technology requirements.

Our global R&D team includes experts from the semiconductor industry and scientists from key disciplines required for the development of high-performance CMP consumable products. We operate an R&D facility in Aurora, Illinois, that features a Class 1 clean room and advanced equipment for product development, including 300mm polishing and metrology capabilities; a facility in Taiwan that includes a clean room with 200mm polishing capability; a facility in South Korea that provides slurry formulation capability and 300mm polishing capability; and, an R&D laboratory in Singapore that provides polishing, metrology and slurry development capabilities for the data storage industry. We also operate R&D facilities in the United States, Europe, and Singapore pertaining to our electronic chemicals business. Our slurry, pads, and electronic chemicals facilities underscore our commitment to continuing to invest in our technology infrastructure to maintain our technology leadership and to be responsive to the needs of our customers.

For our pipeline performance products, in our Flowchem business, we employ several resources and facilities to perform research and development activities. We focus on both improving existing product performance as well as developing new products/technologies to serve our customers’ needs for DRAs.

We also commit R&D resources to our QED subsidiary. These activities are primarily focused on the development of new polishing and metrology capabilities, in support of our MRF and SSI product lines, as well as additional capabilities for our polishing services group. This work is done in our facilities in Rochester, New York.

RAW MATERIALS SUPPLY

Engineered abrasive particles are significant raw materials we use in many of our CMP slurries and pads. Our strategy is to secure various sources of different raw materials, as appropriate, to enable the desired performance of our products, and monitor those sources as necessary to provide supply assurance. Also, we have entered into multi-year supply agreements with several suppliers for the purchase of raw materials in the interest of supply assurance and to control costs. For additional information regarding these agreements, refer to "Tabular Disclosure of Contractual Obligations", included in "Management's Discussion and Analysis of Financial Condition and Results of Operations," in Item 7 of Part II of this Annual Report on Form 10-K. In our electronic chemicals business, we rely on a variety of suppliers for our raw materials, some of which we purchase on open account and others which we purchase under supply contracts. The number of suppliers is often limited, particularly as to the specific grade of raw material required by us to supply high purity products to our customers.

For both our pipeline performance products and our wood treatment products, we depend on outside suppliers for all the raw materials needed to produce our products and are subject to fluctuations in the price of those materials. We purchase raw materials for these businesses from a limited number of suppliers. Most of our QED subsidiary's business relates to capital equipment, thus, there are minimal raw material supply issues that we face within this business unit.

INTELLECTUAL PROPERTY

We believe our intellectual property is important to our success and ability to compete, and we also differentiate our products and technology by their high quality and reliability, and our quality systems, global supply chain and logistics. As of October 31, 2019, we had 1,317 active worldwide patents, of which 284 United States patents, and 357 pending worldwide patent applications, of which 51 are in the United States.

Many of these patents are important to our continued development of new and innovative products for CMP and related processes, as well as for new businesses. Our patents have a range of duration. We refresh our intellectual property on an ongoing basis through continued innovation. As an example, we have had patent coverage that was important to some of our legacy CMP slurry business and continue to have significant other patents that protect this technology and other legacy and advanced technology with a range of duration. We attempt to protect our intellectual property rights through a combination of patent, trademark, copyright and trade secret laws, use of certain manufacturing technologies, exclusive contractual arrangements with suppliers, and with employee and third party-nondisclosure and assignment agreements. We vigorously protect and defend our intellectual property and have been successful in this regard.

Most of our intellectual property has been developed internally, but we also may acquire intellectual property from others to enhance our intellectual property portfolio. These enhancements may be via licenses or assignments or we may acquire certain proprietary technology and intellectual property when we make acquisitions. We believe these technology rights can enhance our competitive advantage by providing us with future product development opportunities and expanding our intellectual property portfolio.

ENVIRONMENTAL MATTERS

Our facilities and operations are subject to various environmental, safety, and human health laws and regulations, both at a federal and state or local level, including those relating to air emissions, wastewater discharges, chemical manufacture and distribution, the handling and disposal of solid and hazardous wastes, storage and disposal, and various other occupational safety and health matters. Governmental authorities can to enforce compliance with their regulations, and violators may be subject to civil, criminal, and administrative penalties, injunctions, or both. We believe that our facilities are in substantial compliance with applicable environmental laws and regulations. Our major operations in the United States, Japan, Singapore, South Korea, Taiwan, France, Italy, and the United Kingdom are certified under current ISO 14001 Environmental and OHSAS 18001 Safety and Health standards, which requires that we implement and operate according to various procedures that demonstrate waste reduction, energy conservation, injury reduction and other environmental, health and safety objectives. We have achieved certification under the revised ISO 14001 standards and are now actively pursuing certification under revised OHSAS 18001 standards that will transition to ISO 45001 standards over the next three years. We have incurred, and will continue to incur, capital and operating expenditures and other costs in complying with environmental, safety and health laws and regulations in the United States and other countries in which we do business, but we do not expect these costs will be material. See "Item, 1A. Risk Factors," Item 3 "Legal Proceedings", and Note 20 of "Notes to the Consolidated Financial Statements" included in Item 8 of Part II of this Annual Report on Form 10-K.

EMPLOYEES

We believe our employees are the foundation of our success. As of October 31, 2019, we employed 2,047 individuals, including 1,385 in operations, 249 in research and development and technical, 413 in sales, general and administration. In general, our employees are not covered by collective bargaining agreements, but we do have some workers who are subject to such agreements, part of works councils, or similar arrangements, primarily in Europe, Mexico, Singapore. We have not experienced any work stoppages and consider our relations with our employees to be good.

FINANCIAL INFORMATION ABOUT GEOGRAPHIC AREAS

We sell our products worldwide. We believe our geographic coverage allows us to utilize our business and technical expertise from a diverse, global workforce, strategically located in close proximity to our customers. As a result of the Acquisition, our geographic mix has changed. For example, in fiscal 2019, our North America revenue as a percentage of total revenue has increased from 13% to 36% compared to fiscal 2018. While approximately 50% of our global revenue is still being generated in Asia Pacific, our dependency on revenue from Asia Pacific has decreased as a result of the Acquisition. For more financial information about geographic areas, see Note 23 of “Notes to the Consolidated Financial Statements” included in Item 8 of Part II of this Annual Report on Form 10-K.

SEASONALITY

Our Electronic Materials business experiences some seasonality, mostly related to fluctuations in consumer demand for MID’s around the December and lunar new year holidays, and back to school periods, but over the past several years seasonality has appeared more muted, tempered by the broader array of factors affecting demand, such as 5G, Cloud computing, and AI. In our Performance Materials business, demand for our pipeline performance products such as DRAs appears to have some seasonality linked to weather, with demand for DRAs increasing in the colder months, yet demand from additional pipeline capacity coming online has made this less apparent.

AVAILABLE INFORMATION

Our annual reports on Form 10-K, quarterly reports on Form 10-Q, definitive proxy statements on Schedule 14A, current reports on Form 8-K, and any amendments to those reports, as well as any other filings with the SEC, are made available free of charge on our Company website, www.cabotcmp.com, as soon as reasonably practicable after such reports are filed with the Securities and Exchange Commission (SEC). Statements regarding beneficial ownership of our securities by our executive officers and directors are made available on our Company website following the filing of such with the SEC. In addition, the SEC’s website (<http://www.sec.gov>) contains reports, proxy statements, and other information that we file electronically with the SEC.

ITEM 1A. RISK FACTORS

RISKS RELATING TO OUR BUSINESS

DEMAND FOR OUR PRODUCTS FLUCTUATES AND OUR BUSINESS MAY BE ADVERSELY AFFECTED BY WORLDWIDE ECONOMIC AND INDUSTRY CONDITIONS

Our business is affected by economic and industry conditions and the majority of our revenue derives from our Electronic Materials segment, which is primarily dependent upon semiconductor industry demand. With respect to our Electronic Materials segment, historically, semiconductor industry demand has fluctuated due to economic and industry cycles and seasonal shifts in demand, which can affect our business, causing demand for our electronic materials products to fluctuate. For example, we have experienced relatively soft demand conditions in the semiconductor industry starting in our second fiscal quarter of 2019 and continuing past the end of the fiscal year, although some signs of stabilization are becoming apparent. Previously, we had experienced the strengthening of demand conditions in the semiconductor industry from the second half of fiscal 2016 through fiscal 2018, following relatively soft demand conditions during the first half of fiscal 2016. Furthermore, competitive dynamics within the semiconductor industry may impact our business. Our limited visibility to future customer orders makes it difficult for us to predict industry trends. If the global economy or the semiconductor industry weakens, whether in general or as a result of specific factors, such as macroeconomic factors, or unpredictable events such as natural disasters or geopolitical events, we could experience material adverse impacts on our results of operations and financial condition. Some additional factors that may affect demand for our electronic materials products include: demand trends for different types of electronic devices, such as logic versus memory IC devices, or digital versus analog IC devices; the various technology nodes at which those products are manufactured; customers' efficiencies in the use of CMP consumables and/or high-purity process chemicals ("electronic chemicals"); customers' device architectures and specific manufacturing processes; the short order to delivery time for our products; quarter-to-quarter changes in customer order patterns; market share and competitive gains and losses; and pricing changes by us and our competitors.

As to our Performance Materials segment, which continues to be an area of potential continued growth for us, our business may be impacted by changes in the utilities and/or oil and gas industries. Volatility in oil and natural gas prices may impact our customers' activity levels, including production, and spending on our performance materials products and services. Expectations about future prices and price volatility are important in determining future spending levels for customers of our pipeline performance products and services. Historically, worldwide oil and natural gas prices and markets have been volatile, and may continue to be so in the future. Prices for oil and natural gas are subject to wide fluctuations in response to relatively minor changes in the supply of and demand for oil and natural gas, market uncertainty and a variety of additional factors that are beyond our control. These factors include, but are not limited to, increases in supplies from U.S. shale production, international political conditions, including uprisings and political unrest, sovereign debt crises, the domestic and foreign supply of oil and natural gas, the level of consumer demand due to economic growth in countries such as China, weather conditions, domestic and foreign governmental regulations and taxes, the price and availability of alternative fuels, the health of international economic and credit markets, the ability of the members of the Organization of Petroleum Exporting Countries and other state-controlled oil companies to agree upon and maintain oil price and production controls, and general economic conditions.

Further, adverse global economic and industry conditions could have other negative effects on our Company. For instance, we could experience negative impacts on cash flows due to the inability of our customers to pay their obligations to us, or our production processes could be harmed if our suppliers cannot fulfill their obligations to us. As a result of these or other conditions, we also might have to reduce the carrying value of goodwill and other intangible assets, which could harm our financial position and results of operations.

WE MAY PURSUE ACQUISITIONS OF, INVESTMENTS IN, AND MERGERS OR STRATEGIC ALLIANCES WITH OTHER ENTITIES, WHICH COULD DISRUPT OUR OPERATIONS AND HARM OUR OPERATING RESULTS IF THEY ARE UNSUCCESSFUL, OR WE MAY ENCOUNTER UNANTICIPATED ISSUES IN IMPLEMENTING THEM

We expect to continue to make investments in technologies, assets and companies, either through acquisitions, mergers, investments or alliances, in order to supplement our organic growth and development efforts. Acquisitions, mergers, and investments, including our acquisitions of KMG, which we completed in November 2018, and NexPlanar, which we completed in October 2015, involve numerous risks, including the following: difficulties and risks in integrating the operations, technologies, products and personnel of acquired companies; difficulties and risks from unanticipated issues arising subsequent to a transaction related to the other entity; potential disruption of relationships with third parties such as customers or suppliers; diversion of management's attention from normal daily operations of the business; increased risk associated with foreign operations; potential difficulties and risks in entering markets or industries in which we have limited or no direct prior experience and/or where competitors have stronger positions; potential difficulties and unexpected situations arising in operating new businesses with different business models; facilities and operations; potential difficulties with regulatory or contract compliance in areas in which we have limited or no experience; initial dependence on unfamiliar supply chains or relatively small supply partners; insufficient revenues to offset increased expenses associated with acquisitions; potential loss of key employees of the acquired companies; or inability to effectively cooperate and collaborate with our alliance partners.

Further, we may never realize the perceived or anticipated benefits of a business combination or merger with, or asset or other acquisition of, or investments in, other entities. Transactions such as our acquisitions of KMG and NexPlanar could and in some cases have had negative effects on our results of operations, in areas such as contingent liabilities, gross margins, amortization charges related to intangible assets and other effects of accounting for the purchases of other business entities. Investments in and acquisitions of technology-related companies or assets are inherently risky because these businesses or assets may never develop, and we may incur losses related to these investments.

In addition, we may be required to impair the carrying value of these acquisitions or investments to reflect other than temporary declines in their value. The carrying value of goodwill represents the fair value of acquired businesses in excess of identifiable assets and liabilities as of the acquisition date. The carrying value of other intangible assets represents the fair value of customer relationships, tradenames and other acquired intangible assets as of the acquisition date. Goodwill and other acquired intangible assets expected to contribute indefinitely to our cash flows are not amortized, but must be evaluated for impairment by management at least annually. If the carrying value exceeds the implied fair value of goodwill, the goodwill is considered impaired and is reduced to fair value via a non-cash charge to earnings. If the carrying value of an indefinite-lived intangible asset is greater than its fair value, the intangible asset is considered impaired and is reduced to fair value via a non-cash charge to earnings. If the value of goodwill or other acquired intangible assets is impaired, our results of operations and financial condition could be adversely affected. Examples of asset impairment charges we recently incurred include the charge we took in the fourth quarter of fiscal year 2019 related to the KMG wood treatment business. Absent a sale of the wood treatment business, as we approach the announced closure date of the Matamoros and Tuscaloosa facilities and there are fewer estimated future cash flows, there is ongoing potential for further impairments of long-lived assets and impairment of goodwill. While the timing and amounts of any further impairments are unknown, our results of operations and financial condition could be adversely affected. See Notes 9 and 10 of "Notes to the Consolidated Financial Statements" included in Item 8 of Part II of this Annual Report on Form 10-K for a more detailed discussion of this impairment.

Furthermore, the integration of the recently acquired KMG business into our operations is a complex and time-consuming process that may not be successful. Our Company has a limited history of integrating a significant acquisition into its business and the process of integration may produce unforeseen operating difficulties and expenditures. The primary areas of focus for successfully combining the business of KMG with our operations may include and has included, among others: retaining and integrating key employees; realizing synergies; aligning customer and supplier interface, and operations across the combined business; integrating enterprise resource planning and other information technology systems; and managing the growth of the combined company. Even if we successfully integrate the business of KMG into our operations, there can be no assurance that we will realize the anticipated benefits of the Acquisition.

WE HAVE A CONCENTRATED PRODUCT RANGE WITHIN EACH OF OUR SEGMENTS AND OUR PRODUCTS MAY BECOME OBSOLETE, OR TECHNOLOGICAL CHANGES MAY REDUCE OR LIMIT INCREASES IN THE CONSUMPTION OF OUR PRODUCTS

Although our product offerings have expanded with the Acquisition, our business remains substantially dependent on products in our Electronic Materials segment, such as CMP slurries, pads and electronic chemicals, which account for the majority of our revenue. We have identified our Performance Materials segment as another area of potential continued growth and the product offerings in our Performance Materials segment are similarly concentrated. As such, our business would suffer if these products became obsolete or if consumption of these products decreased. Our success depends on our ability to keep pace with technological changes and advances in the industries in which we operate, particularly the semiconductor industry, and to adapt, improve and customize our products in response to evolving customer needs and industry trends. Since its inception, the semiconductor industry, which is the largest industry in which we operate, has experienced technological changes and advances in the design, manufacture, performance and application of IC devices. Our customers continually pursue lower cost of ownership and higher quality and performance of materials consumed in their manufacturing processes, including CMP slurries and pads and electronic chemicals, as a means to reduce costs, increase the yield in their manufacturing facilities, and achieve desired performance of the IC devices they produce. We expect these technological changes, and this drive toward lower costs, higher quality and performance and higher yields, will continue in the future. Potential technology developments in the semiconductor industry, as well as our customers' efforts to reduce consumption of CMP consumables, including through use of smaller quantities, could render our products less important to the IC device manufacturing process.

A SIGNIFICANT AMOUNT OF OUR BUSINESS COMES FROM A LIMITED NUMBER OF LARGE CUSTOMERS AND OUR REVENUE AND PROFITS COULD DECREASE SIGNIFICANTLY IF WE LOST ONE OR MORE OF THESE CUSTOMERS OR BUSINESS FROM THEM

Our customer base is concentrated among a limited number of large customers in each of our segments. Currently, our principal business is to supply electronic materials primarily to the semiconductor industry. The semiconductor industry has been consolidating as the larger semiconductor manufacturers have generally grown faster than the smaller ones, through business gains, mergers and acquisitions, and strategic alliances. Industry analysts predict that this trend will continue, which means the semiconductor industry will continue to be comprised of fewer and larger participants in the future if their prediction is correct. In addition, our customer base in our pipeline-related businesses is also somewhat concentrated, with large entities predominant, and outside of the United States, these entities frequently are state-owned or sponsored, and limited in number per country, as described more above. One or more of these principal customers could stop buying products from us or could substantially reduce the quantity of products purchased from us. Our principal customers in both of our segments also hold considerable purchasing power, which can impact the pricing and terms of sale of our products. Any deferral or significant reduction in the quantity or price of products sold to these principal customers could seriously harm our business, financial condition and results of operations.

ANY PROBLEM OR DISRUPTION IN OUR SUPPLY CHAIN, INCLUDING SUPPLY OF OUR MOST IMPORTANT RAW MATERIALS, OR IN OUR ABILITY TO MANUFACTURE OR DELIVER OUR PRODUCTS TO OUR CUSTOMERS, COULD ADVERSELY AFFECT OUR RESULTS OF OPERATIONS

We depend on our supply chain to enable us to meet the demands of our customers. Our supply chain includes the raw materials we use to manufacture our products, our production operations and the means by which we deliver our products to our customers. Our business could be adversely affected by any problem or interruption in the supply of the key raw materials we use in our products, including raw materials that do not meet the stringent quality and consistency requirements of our customers, any problem or interruption that may occur during production or delivery of our products, such as weather-related problems, natural disasters, or geopolitical, trade or labor-related issues, or any difficulty in producing sufficient quantities of our products to meet growing demand from our customers. In particular, severe weather conditions have the potential to adversely affect our operations, damage facilities and increase our costs, and those conditions may also have an indirect effect on our operations by disrupting services provided by service companies or suppliers with whom we have a business relationship. Additionally, some of our full-time employees are represented by labor unions, works councils or comparable organizations, particularly in Mexico and Europe. As our current agreements expire, we cannot provide assurance that new agreements will be reached at the end of each period without union action, or that a new agreement will be reached on terms satisfactory to us. An extended work stoppage, slowdown or other action by our employees could significantly disrupt our business. Future labor contracts may be on terms that result in higher labor costs to us, which also could adversely affect our results of operations. Our supply chain may also be negatively impacted by unanticipated price increases due to supply restrictions beyond the control of our Company or our raw materials suppliers.

We believe it would be difficult to promptly secure alternative sources of key raw materials in the event one of our suppliers becomes unable to supply us with sufficient quantities of raw materials that meet the quality and technical specifications required by us and our customers. In addition, new contract terms, forced production or manufacturing changes, contractual amendments to existing agreements with, or non-performance by, our suppliers, including any significant financial distress our suppliers may suffer, could adversely affect us. Also, if we change the supplier or type of key raw materials we use to make our products, in particular our electronic materials products, or are required to purchase them from a different manufacturer or manufacturing facility or otherwise modify our products, in certain circumstances our customers might have to requalify our products for their manufacturing processes and products. The requalification process could take a significant amount of time and expense to complete and could occupy technical resources of our customers that might otherwise be used to evaluate our new products, thus delaying potential revenue growth, or motivate our customers to consider purchasing products from our competitors, possibly interrupting or reducing our sales of products to these customers, especially sales of our electronic materials products to our semiconductor industry customers, but also with respect to our pipeline performance products to our pipeline and adjacent industry customers.

OUR BUSINESS COULD BE SERIOUSLY HARMED IF OUR COMPETITORS DEVELOP COMPETITIVE PRODUCTS, OFFER BETTER PRICING, SERVICE OR OTHER TERMS, OR OBTAIN OR ASSERT CERTAIN INTELLECTUAL PROPERTY RIGHTS

Competition from other electronic materials or performance materials manufacturers or any new entrants could seriously harm our business and results of operations, and this competition could continue to increase. Competition has and will likely continue to impact the prices we are able to charge for our products, as well as our overall business. In addition, our competitors could have, obtain or assert intellectual property rights that could affect or restrict our ability to market our existing products and/or to innovate and develop new products, thus increasing our costs of doing business, could attempt to introduce products similar to ours following the expiration of our patents, or could attempt to introduce products that do not fall within the scope of our intellectual property rights.

WE ARE SUBJECT TO RISKS ASSOCIATED WITH OUR FOREIGN OPERATIONS

We currently have operations and a large customer base outside of the United States. Approximately 64% of our revenue was generated by sales to customers outside of the United States for the full fiscal year ended September 30, 2019. We may encounter risks in doing business in certain foreign countries, including, but not limited to, adverse changes in economic and political conditions, both in foreign locations and in the United States with respect to non-U.S. operations of U.S. businesses like ours, geopolitical and/or trade tensions, fluctuation in exchange rates, changes in international trade requirements and sanctions and/or tariffs that affect our business and that of our customers and suppliers, compliance with a variety of foreign laws and regulations and related audits and investigations, as well as difficulty in enforcing business and customer contracts and agreements, including protection of intellectual property rights. We also may encounter risks that we may not be able to repatriate additional earnings from our foreign operations, derive anticipated tax benefits of our foreign operations or recover the investments made in our foreign operations, whether due to regulatory or policy changes in the U.S. or in the countries outside of the U.S. in which we do business, or other factors.

In particular, China continues to be a fast-developing market for the semiconductor industry, and an area of potential growth for us. As business volume between China and the rest of the world continues to grow, there is risk that geopolitical, regulatory, trade and political matters could adversely affect business for companies like ours based on the complex relationships among China, the United States, and other countries in the Asia Pacific region or elsewhere, which could have a material adverse impact on our business. In addition, there are risks that the Chinese government may, among other things, require the use of local suppliers, compel companies that do business in China to partner with local companies to conduct business, or, provide incentives to government-backed local customers to buy from local suppliers rather than companies like ours, all of which could adversely impact our business, including our results of operations.

In addition, we have operations and customers located in the United Kingdom, where voters have approved an exit from the European Union (“Brexit”), which is supposed to occur by January 31, 2020. The United Kingdom and the European Union have agreed to operate under transitional provisions under which most European Union law would remain in force in the United Kingdom until the end of December 2020, however, this transitional period remains subject to the successful conclusion of a final withdrawal agreement between the parties. In the absence of such an agreement, there would be no transitional provisions and a “hard” Brexit would occur. Although it is unknown what the terms of such an agreement, assuming it is reached, will be, it is possible that there will be greater restrictions on imports and exports between the United Kingdom and European Union countries, a fluctuation in currency exchange rates and increased regulatory complexities. These changes may adversely affect our operations and financial results. While such changes in laws, regulations and conditions have not had a material adverse effect on our business or financial condition to date, we cannot provide assurances regarding the future effect of any such changes.

WE ARE SUBJECT TO EXTENSIVE ENVIRONMENTAL LAWS AND REGULATIONS AND MAY INCUR COSTS THAT HAVE AN ADVERSE EFFECT ON OUR FINANCIAL CONDITION AS A RESULT OF VIOLATIONS OF OR LIABILITIES UNDER THEM

Like other companies involved in environmentally sensitive businesses, our operations and properties are subject to extensive and stringent federal, state, local and foreign environmental, health and safety (EHS) laws and regulations, including those concerning, among other things:

- the marketing, sale, use and registration of our chemical products, such as pentachlorophenol (“penta”), which is part of the wood treatment business in our Performance Materials segment;
- the treatment, storage and disposal of wastes;
- the investigation and remediation of contaminated media including but not limited to soil and groundwater;
- the discharge of effluents into waterways;
- the emission of substances into the air; and
- other matters relating to environmental protection and various health and safety matters.

The EPA and other federal and state agencies in the United States, as well as comparable agencies in other countries where we have facilities or sell our products, have the authority to promulgate regulations that could have a material adverse impact on our operations. These EHS laws and regulations may require permits for certain types of operations, require the installation of expensive pollution control equipment, place restrictions upon operations or impose substantial liability for pollution and other EHS concerns resulting from our operations. Compliance with EHS laws and regulations has resulted in ongoing costs for us and could restrict our ability to modify or expand our facilities, continue production, require us to install costly pollution control equipment, or incur significant other expenses, including remediation costs. We are currently involved in investigation and remediation activities at certain sites, such as at KMG-Bernuth's Tuscaloosa, Alabama facility as described in Note 10 of “Notes to the Consolidated Financial Statements” included in Item 8 of Part II of this Annual Report on Form 10-K. We have incurred, and expect to continue to incur, significant costs to comply with EHS laws or to address liabilities for contamination resulting from past or present operations. Federal, state and foreign governmental authorities may seek fines and penalties, as well as injunctive relief, for violation of EHS laws and regulations, and could, among other things, impose liability on us to cleanup or mitigate environmental, natural resources or other damages resulting from a release of pesticides, hazardous materials or other chemicals into the environment. We maintain insurance coverage for sudden and accidental environmental damages. We do not believe that insurance coverage for environmental damage that occurs over time is available at a reasonable cost. Also, we do not believe that insurance coverage for the full potential liability that could be caused by sudden and accidental incidences is available at a reasonable cost. Accordingly, we may be subject to an uninsured or under-insured loss in such cases; although unknown at present, the KMG-Bernuth warehouse fire may be such an instance.

The distribution, sale and use of our products is subject to prior governmental approvals and thereafter ongoing governmental regulation: Our products are subject to laws administered by federal, state and foreign governments, including regulations requiring registration, approval and labeling. The labeling requirements restrict the use and type of application for our products. More stringent restrictions could make our products less desirable which would adversely affect our sales and profitability. All venues where our penta products are used also require registration prior to marketing or use.

Governmental regulatory authorities have required, and may require in the future, that certain scientific testing and data production be provided on our products. Under the Federal Insecticide, Fungicide and Rodenticide Act (“FIFRA”), EPA requires registrants to submit a wide range of scientific data to support U.S. registrations. This requirement significantly increases our operating expenses, and we expect those expenses will continue in the future. Because scientific analyses are constantly improving, we cannot determine with certainty whether or not new or additional tests may be required by regulatory authorities. While good laboratory practice standards specify the minimum practices and procedures that must be followed in order to ensure the quality and integrity of data related to these tests submitted to the EPA, there can be no assurance that the EPA will not request certain tests or studies be repeated. In addition, more stringent legislation or requirements may be imposed in the future. Recent changes to the Toxic Substances Control Act (“TSCA”) could result in increased regulation and required testing of chemicals we manufacture and could increase the costs of compliance for our operations. We can provide no assurance that the cost of such compliance will not adversely affect our profitability. Our products could also be subject to other future regulatory action that may result in restricting or completely banning their use which could have an adverse effect on our performance and results of operations.

1. The Registration, Evaluation and Authorization of Chemicals (“REACH”) legislation may affect our ability to manufacture and sell certain products in the European Union: REACH requires chemical manufacturers and importers in the European Union to prove the safety of their products. We were required to pre-register certain products and file comprehensive reports, including testing data, on each chemical substance, and perform chemical safety assessments. Additionally, substances of high concern are subject to an authorization process. Authorization may result in restrictions on certain uses of products or even prohibitions on the manufacture or importation of products. The full registration requirements of REACH are phased in over several years. We will incur additional expense to cause the registration of our products under these regulations. REACH may also affect our ability to import, manufacture and sell certain products in the European Union. In addition, other countries and regions of the world already have or may adopt legislation similar to REACH that affect our business, affect our ability to import, manufacture or sell certain products in these jurisdictions, and have required or will require us to incur increased costs.

2. The classification of penta as a Persistent Organic Pollutant (“POP”) under the Stockholm Convention may adversely affect our ability to manufacture or sell our penta products: The Conference of the Parties (“COP”) accepted the recommendation of the United Nations Persistent Organic Pollutant Review Committee that the use of penta should be banned except that its use for the treatment of utility poles and crossarms could continue for an extended period of five to ten years. KMG-Bernuth supplies penta to industrial customers who use it primarily to treat utility poles and crossarms. The U.S. is not bound by the determination of the COP because it did not ratify the Stockholm Convention treaty. Canada and Mexico are governed by the treaty. KMG-Bernuth's sole penta manufacturing facility is located in Matamoros, Mexico, and its processing facility is located in Tuscaloosa, Alabama. As a result of the classification of penta as a POP, the Mexican government requires KMG-Bernuth to cease producing penta in Mexico by the end of 2021. In July 2019, KMG-Bernuth had communicated plans to close both the Matamoros and Tuscaloosa facilities by such date and to consolidate into and build a new facility. However, in November 2019, we communicated that we will not build a new facility, and that we intend to explore various options for the wood treatment business. We have taken a restructuring charge and asset impairment charges in our fourth fiscal quarter related to the decision to close the Matamoros and Tuscaloosa facilities and to not build a new plant. No assurance can be given that we will not incur significant expenditures in connection with closing the facilities, or that the ultimate action of the COP and our related decisions will not adversely impact on our financial condition and results of operation.

3. If our products are not re-registered by the EPA or are re-registered subject to new restrictions, our ability to sell our products may be curtailed or significantly limited: KMG-Bernuth's penta product registrations are under continuous review by the EPA under FIFRA. KMG-Bernuth has submitted and will submit a wide range of scientific data to support its U.S. registrations. To satisfy the registration review, KMG-Bernuth is required to demonstrate, among other things, that its products will not cause unreasonable adverse effects on human health or the environment when used according to approved label directions. In September 2008, the EPA announced that it had determined that penta was eligible for re-registration, but the EPA proposed new restrictions on the use of penta that have required KMG-Bernuth's customers to incur substantial additional costs and to revise certain operating procedures. In December 2014, the EPA issued a registration review work plan that required penta registrants to provide additional research and testing data respecting certain potential risks to human health or the environment as a further condition to continued registration. KMG-Bernuth conducted required testing, but cannot tell you when or if the EPA will issue a final decision concluding that the conditions of re-registration for its penta products and all additional testing requirements have been satisfied. We cannot assure you that KMG-Bernuth's products will not be subject to use or labeling restrictions that may have an adverse effect on our financial position and results of operations. The failure of KMG-Bernuth's current or future-acquired products to be re-registered, to satisfy the registration review by the EPA, or the imposition of new use, labeling or other restrictions in connection with re-registration could have an adverse effect on our financial condition and results of operations.

4. Our use of hazardous materials exposes us to potential liabilities: Our manufacturing and distribution of chemical products, such as our electronic chemicals, involves the controlled use of hazardous materials. Our operations, therefore, are subject to various associated risks, including chemical spills, discharges or releases of toxic or hazardous substances or gases, fires, mechanical failure, storage facility leaks and similar events. Our suppliers are subject to similar risks that may adversely impact the availability of raw materials. While we adapt our manufacturing and distribution processes to the environmental control standards of regulatory authorities, we cannot completely eliminate the risk of accidental contamination or injury from hazardous or regulated materials, including injury of our employees, individuals who handle our products or goods treated with our products, or others who claim to have been exposed to our products, nor can we completely eliminate the unanticipated interruption or suspension of operations at our facilities due to such events. We may be held liable for significant damages or fines in the event of contamination or injury, and such assessed damages or fines could have an adverse effect on our financial performance and results of operations.

FUTURE CLIMATE CHANGE REGULATION COULD RESULT IN INCREASED OPERATING COSTS AND REDUCED DEMAND FOR OUR PRODUCTS

Although the U.S. has not ratified the Kyoto Protocol, a number of federal laws related to “greenhouse gas” or “GHG” emissions have been considered by Congress. Because of the lack of any comprehensive legislation program addressing GHGs, the EPA is using its existing regulatory authority to promulgate regulations requiring reduction in GHG emissions from various categories of sources, such as when a permit is required due to emissions of other pollutants. In addition, various state, local and regional regulations and initiatives have been enacted or are being considered related to GHGs.

Member States of the European Union each have an overall cap on emissions, which are approved by the European Commission, and implement the EU Emissions Trading Directive as a commitment to the Kyoto Protocol. Under this Directive, organizations apply to the Member State for an allowance of GHG emissions. These allowances are tradable so as to enable companies that manage to reduce their GHG emissions to sell their excess allowances to companies that are not reaching their emissions objectives. Failure to purchase sufficient allowances will require the purchase of allowances at a current market price.

Any laws or regulations that may be adopted to restrict or reduce emissions of GHGs could cause an increase to our raw material costs, require us to incur increased operating costs, and have an adverse effect on demand for our products and our financial performance and results for our business.

OUR PRODUCTS MAY BE RENDERED OBSOLETE OR LESS ATTRACTIVE BY CHANGES IN INDUSTRY REQUIREMENTS OR BY SUPPLY-CHAIN DRIVEN PRESSURES TO SHIFT TO ENVIRONMENTALLY PREFERABLE ALTERNATIVES

Changes in regulatory, legislative and industry requirements, or changes driven by supply-chain pressures, may shift current customers away from products using penta, products containing hazardous materials, or certain of our other products and toward alternative products that are believed to have fewer environmental effects. The EPA, foreign and state regulators, local governments, private environmental advocacy organizations and a number of large industrial companies have proposed or adopted policies designed to decrease the use of a variety of chemicals, including penta and others included in certain of our products, such as those containing hazardous materials. Our ability to anticipate changes in regulatory, legislative, and industry requirements, or changes driven by supply-chain pressures, affects our ability to remain competitive. Further, we may not be able to comply with changed or new regulatory or industrial standards that may be necessary for us to remain competitive.

We cannot assure you that the EPA, foreign and state regulators or local governments will not restrict the uses of penta or certain of our other products or ban the use of one or more of these products or the raw materials in them. Similarly, companies who use our products may decide to reduce significantly or cease the use of our products voluntarily. As a result, our products may become obsolete or less attractive to our customers.

BECAUSE WE RELY ON OUR INTELLECTUAL PROPERTY, OUR FAILURE TO ADEQUATELY OBTAIN OR PROTECT IT COULD SIGNIFICANTLY HARM OUR BUSINESS

Protection of intellectual property is particularly important in our industry because we develop complex technical formulas and processes for products that are proprietary in nature and differentiate our products from those of our competitors. Our intellectual property is important to our success and ability to compete. We attempt to protect our intellectual property rights through a combination of patent, trademark, copyright and trade secret laws, as well as employee and third-party nondisclosure and assignment agreements. In addition, we protect our product differentiation through various other means, such as proprietary supply arrangements for certain raw materials, and use of certain manufacturing technologies. Due to our international operations, we pursue protection in different jurisdictions, which may provide varying degrees of protection, and we cannot provide assurance that we can obtain adequate protection in each such jurisdiction. Our failure to obtain or maintain adequate protection of our intellectual property rights for any reason, including through the patent prosecution process or in the event of litigation related to such intellectual property, could seriously harm our business. In addition, certain types of intellectual property, such as patents, expire after a certain period of time, and products protected by our patents then lose such protection, so we refresh our intellectual property portfolio on an ongoing basis through continued innovation, and failure to do so could adversely affect our business. Also, the costs of obtaining or protecting our intellectual property could negatively affect our operating results.

OUR INABILITY TO ATTRACT AND RETAIN KEY PERSONNEL COULD CAUSE OUR BUSINESS TO SUFFER

We utilize and rely upon a global workforce. If we fail to attract and retain the necessary managerial, technical and customer support personnel, our business and our ability to maintain existing and obtain new customers, develop new products and provide acceptable levels of customer service could suffer. We compete worldwide with other industry participants for qualified personnel, particularly those with significant experience in the semiconductor industry. The loss of services of key employees, or our inability to obtain or maintain visas or other travel or residency documents on their behalf with respect to our business needs, could harm our business and results of operations. Periodically, we engage in succession planning for our key employees, and our Board of Directors reviews succession planning for our executive officers, including our chief executive officer, on an annual basis.

BECAUSE WE HAVE LIMITED EXPERIENCE IN BUSINESS AREAS OUTSIDE OF ELECTRONIC MATERIALS AND PERFORMANCE MATERIALS, EXPANSION OF OUR BUSINESS INTO OTHER PRODUCTS AND APPLICATIONS MAY NOT BE SUCCESSFUL

An element of our strategy has been to leverage our customer relationships, technological expertise and other capabilities and competencies to expand our business. For example, we have made acquisitions to expand beyond CMP consumables into other electronic materials product areas, as well as into performance materials product areas in which we have limited experience. Expanding our business into new product areas could involve technologies, production processes and business models in which we have limited experience, and we may not be able to develop and produce products or provide services that satisfy customers' needs, or we may be unable to keep pace with technological or other developments. Or, we may decide that we no longer wish to pursue these new business initiatives. Also, our competitors may have or obtain intellectual property rights that could restrict our ability to market our existing products and/or to innovate and develop new products.

TAX INCREASES OR CHANGES IN TAX RULES MAY ADVERSELY AFFECT OUR FINANCIAL RESULTS

As a company conducting business on a global basis, we are exposed, both directly and indirectly, to effects of changes in United States, state, local and foreign tax rules. In December 2017, comprehensive tax legislation commonly referred to as the Tax Cuts and Jobs Act (the "Tax Act") was enacted in the United States. Known and certain estimated effects based upon current interpretation of the Tax Act have been incorporated into our financial results. As additional clarification and implementation guidance is issued on the Tax Act, it may be necessary to adjust our income tax estimates, as we experienced in our second fiscal quarter of fiscal 2019 with respect to our previously reported Transition Tax describe in Note 19 of "Notes to the Consolidated Financial Statements" included in Item 8 of Part II of this Annual Report on Form 10-K. Adjustments to income tax amounts could be material to our results of operations and cash flows. In addition, there is a risk that state or foreign jurisdictions may amend their tax laws in response to the Tax Act, which could have a material impact on our future results of operations and cash flows.

CERTAIN CRITICAL INFORMATION SYSTEMS COULD BE SUSCEPTIBLE TO CYBERSECURITY AND OTHER THREATS

We maintain and rely upon certain critical information systems for the effective operation of our business. These information systems include, but are not limited to, telecommunications, the Internet, our corporate intranet, various computer hardware and software applications, network communications, and email. These information systems may be owned and maintained by us, our outsourced providers, or third parties such as vendors, contractors, and Cloud providers. All of these information systems are subject to disruption, breach or failure from various sources including, but not limited to, attacks, degradation, and failures resulting from potential sources, including viruses, malware, denial of service, destructive or inadequate code, power failures, and physical damage. Confidential and/or sensitive information stored on these information systems, or transmitted to or from Cloud storage, could be intentionally or unintentionally compromised, lost, and/or stolen. While we have implemented security procedures and virus protection software, intrusion prevention systems, access control, and emergency recovery processes to mitigate risks like these with respect to information systems that are under our control, they are not fail-safe and may be subject to breaches. Further, we cannot assure that third parties upon whom we rely for various IT services will maintain sufficient vigilance and controls over their systems. Our inability to use or access these information systems at critical points in time, or unauthorized releases of personal or confidential information, could unfavorably impact the timely and efficient operation of our business, including our results of operations, and our reputation, as well as our relationships with our employees or other individuals whose information may have been affected by such cybersecurity incidents.

In addition, regulatory authorities have increased their focus on how companies collect, process, use, store, share and transmit personal data. New privacy security laws and regulations, including the United Kingdom's Data Protection Act 2018 and the European Union General Data Protection Regulation 2016, and similar laws in countries such as Korea and Taiwan, among others, pose increasingly complex compliance challenges, which may increase compliance costs, and any failure to comply with data privacy laws and regulations could result in significant penalties.

OUR ABILITY TO RAISE CAPITAL IN THE FUTURE MAY BE LIMITED, WHICH COULD PREVENT US FROM GROWING, AND OUR EXISTING CREDIT AGREEMENT COULD RESTRICT OUR BUSINESS ACTIVITIES

We may in the future be required to raise capital through public or private financing or other arrangements. Such financing may not be available on acceptable terms, or at all, and our failure to raise capital when needed could harm our business. Our Credit Agreement contains financial and other covenants that may restrict our business activities or our ability to execute our strategic objectives, and our failure to comply with these covenants could result in a default under our Credit Agreement. Furthermore, additional equity financing may dilute the interests of our common stockholders, and debt financing, if available, may involve restrictive covenants that could further restrict our business activities or our ability to execute our strategic objectives and could reduce our profitability. If we raise or borrow funds on acceptable terms, we may not be able to grow our business or respond to competitive pressures.

In addition, borrowings under our Credit Facilities generally bear interest based on (a) a London Inter-bank Offered Rate ("LIBOR"), subject to a 0.00% floor, or (b) a base rate, in each case plus an applicable margin of, in the case of borrowings under the Term Loan Facility, 2.25% for LIBOR loans and 1.25% for base rate loans and, in the case of borrowings under the Revolving Credit Facility, initially, 1.50% for LIBOR loans and 0.50% for base rate loans. On July 27, 2017, the Financial Conduct Authority (the authority that regulates LIBOR) announced that it intends to stop compelling banks to submit rates for the calculation of LIBOR after 2021. In the United States, the Alternative Reference Rates Committee ("ARRC"), the working group formed to recommend an alternative rate to LIBOR, has identified the Secured Overnight Financing Rate ("SOFR") as its preferred alternative rate for USD LIBOR. When LIBOR ceases to exist after 2021, any calculation of interest based upon the Alternate Base Rate (or any comparable or replacement formulation), may result in higher interest rates. To the extent that these interest rates increase, our Interest expense will increase, which could adversely affect our financial condition, operating results and cash flows.

RISKS RELATING TO THE MARKET FOR OUR COMMON STOCK

THE MARKET PRICE MAY FLUCTUATE SIGNIFICANTLY AND RAPIDLY

The market price of our common stock has fluctuated and could continue to fluctuate significantly as a result of factors such as: economic, geopolitical, political and stock market conditions generally and specifically as they may impact participants in the semiconductor and related industries; changes in financial estimates and recommendations by securities analysts who follow our stock; earnings and other announcements, and changes in market evaluations, by securities analysts, investors, market participants or others, of or related to, us or participants in the semiconductor and related industries; changes in business, trade or regulatory conditions affecting us or participants in the semiconductor and related industries; announcements or implementation by us, our competitors, or our customers of technological innovations, new products or different business strategies; changes in our capital deployment strategy, issuances of shares of our capital stock or entering into a business combination or other strategic transaction; and trading volume of our common stock.

ANTI-TAKEOVER PROVISIONS UNDER OUR CERTIFICATE OF INCORPORATION AND BYLAWS MAY DISCOURAGE THIRD PARTIES FROM MAKING AN UNSOLICITED BID FOR OUR COMPANY

Our certificate of incorporation and bylaws, and various provisions of the Delaware General Corporation Law may make it more difficult or expensive to effect a change in control of our Company. For instance, our amended and restated certificate of incorporation provides for the division of our Board of Directors into three classes as nearly equal in size as possible with staggered three-year terms.

We have adopted change in control arrangements covering our executive officers and other key employees. These arrangements provide for a cash severance payment, continued medical benefits and other ancillary payments and benefits upon termination of service of a covered employee's employment following a change in control, which may make it more expensive to acquire our Company.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

The material properties owned by the Company consist of the following:

- a global headquarters and research and development facility in Aurora, Illinois, comprising approximately 200,000 square feet, which serves both of our segments;
- a commercial slurry manufacturing plant and distribution center in Aurora, Illinois, comprising approximately 175,000 square feet, which serves our Electronic Materials segment;
- an electronic chemicals manufacturing plant and distribution center in Pueblo, Colorado, comprising approximately 1,629,000 square feet, which serves our Electronic Materials segment;
- a pipeline performance materials manufacturing plant and distribution center in Waller, Texas, comprising approximately 1,742,000 square feet, which serves our Performance Materials segment;
- a commercial slurry and pad manufacturing plant, automated warehouse, research and development facility and offices in Kaohsiung County, Taiwan, comprising approximately 190,000 square feet, which serves our Electronic Materials segment;
- a commercial slurry manufacturing plant and distribution center, and a development and technical support facility in Geino, Japan, comprising approximately 165,000 square feet, which serves our Electronic Materials segment; and
- a commercial slurry manufacturing plant, development facility and offices in Oseong, South Korea, comprising approximately 110,000 square feet, which serves our Electronic Materials segment.

The material properties leased by the Company consist of the following:

- a commercial pad manufacturing plant and offices in Hillsboro, Oregon, comprising approximately 140,000 square feet, which serves our Electronic Materials segment;
- a commercial slurry manufacturing plant, research and development facility and offices in Singapore, comprising approximately 24,000 square feet, which serves our Electronic Materials segment;
- an electronic chemicals manufacturing plant and distribution center in Singapore, comprising approximately 213,000 square feet, which serves our Electronic Materials segment; and
- an electronic chemicals manufacturing plant and distribution center in Riddings, UK, comprising approximately 183,000 square feet, which serves our Electronic Materials segment.

We also own and lease space in various locations worldwide for manufacturing, distribution, technical support, sales, training, and general administrative purposes. We believe that our facilities are suitable and adequate for their intended purpose and provide us with sufficient capacity and capacity expansion opportunities and technological capability to meet our current and expected demand in the foreseeable future. We intend to expand certain of our Electronic Materials and Performance Materials facilities to meet our anticipated business needs.

ITEM 3. LEGAL PROCEEDINGS

We periodically become a party to legal proceedings, arbitrations, and regulatory proceedings (“contingencies”) arising in the ordinary course of our business operations. The ultimate resolution of these contingencies is subject to significant uncertainty, and should we fail to prevail in any of them or should several of them be resolved against us in the same reporting period, these matters could, individually or in the aggregate, be material to our consolidated financial statements. One of these contingencies, related to Star Lake Canal, which we assumed in connection with the Acquisition, is discussed below. The ultimate outcome of these matters, however, cannot be determined at this time, nor can the amount of any potential loss be reasonably estimated, and as a result except where indicated no amounts have been recorded in our consolidated financial statements. The Company records legal costs associated with loss contingencies as expenses in the period in which they are incurred.

On May 31, 2019, a fire occurred at the warehouse of the facility of KMG’s subsidiary, KMG-Bernuth, in Tuscaloosa, Alabama, which processes penta for sale to customers in the United States and Canada. The warehouse fire, which we believe originated from non-hazardous waste materials temporarily stored in the warehouse for recycling purposes, caused no injuries and was extinguished in less than an hour. Company personnel investigated the incident, and KMG-Bernuth commenced cleanup with oversight from certain local, state and federal authorities. The carrying value of the warehouse and the affected inventory are not material. Applying the accounting guidance under ASC 410-30, Environmental Obligations and ASC 450, Contingencies, we determined that since we have environmental obligations as of the date of the fire, costs for the fire waste cleanup and disposal should be recognized to the extent they are probable and reasonably estimable. We have applied these criteria and recorded an undiscounted amount of \$9,494 loss contingency regarding disposal costs that can be reasonably estimated at this time. These disposal costs were charged to Cost of sales. There are potential additional disposal and other costs that cannot be reasonably estimated as of this time related to materials in the warehouse or otherwise impacted by the incident. The fire waste cleanup and disposal costs have been and may continue to be significant due to the nature of federally-regulated penta-related waste cleanup and disposal requirements. We will continue to update the estimated losses as new information becomes available.

In addition, we are working with our insurance carriers on possible recovery of losses and costs, but at this point we cannot reasonably estimate whether we will receive, or if so, the amount of, any potential insurance recoveries. As such, no insurance recoveries have been recognized as of September 30, 2019.

Separately, in 2014, prior to the Acquisition, EPA had notified KMG-Bernuth, that the EPA considered it to be a potentially responsible party under the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (“CERCLA”) by virtue of its relationship with certain alleged predecessor companies, including Idacon, Inc (f/k/a Sonford Chemical Company) in connection with the Star Lake Canal Superfund Site near Beaumont, Texas. The EPA has estimated that the remediation will cost approximately \$22.0 million. KMG-Bernuth and approximately seven other parties entered into an agreement with the EPA in September 2016 to complete a remedial design phase of the remediation of the site. The remediation work will be performed under a separate future agreement. Although KMG-Bernuth has not conceded liability, a reserve in connection with the remedial design was established, and as of September 30, 2019, the reserve remaining was \$728.

We also may face other governmental or third-party claims, or otherwise incur costs, relating to cleanup of, or for injuries resulting from, contamination at sites associated with this or other past and present operations. We accrue for environmental liabilities when a determination can be made that they are probable and reasonably estimable. Other than as described herein, we are not involved in any legal proceedings that we believe could have a material impact on our consolidated financial position, results of operations or cash flows.

In addition, our Company is subject to extensive federal, state and local laws, regulations and ordinances in the U.S. and in other countries. These regulatory requirements relate to the use, generation, storage, handling, emission, transportation and discharge of certain hazardous materials, substances and waste into the environment. The Company, including its KMG entities, manage EHS matters related to protection of the environment and human health, the cleanup of contaminated sites, the treatment, storage and disposal of wastes, and the emission of substances into the air or waterways, among other EHS concerns. Governmental authorities can enforce compliance with their regulations, and violators may be subject to fines, injunctions or both. The Company devotes significant financial resources to compliance, including costs for ongoing compliance.

Certain licenses, permits and product registrations are required for the Company’s products and operations in the U.S., Mexico and other countries in which it does business. The licenses, permits and product registrations are subject to revocation, modification and renewal by governmental authorities. In the United States, in particular, producers and distributors of penta, which is a product manufactured and sold by KMG-Bernuth as part of the wood treatment business, are subject to registration and notification requirements under the FIFRA and comparable state law in order to sell this product in the United States. Compliance with these requirements may have a significant effect on our business, financial condition and results of operations.

We are subject to contingencies, including litigation relating to EHS laws and regulations, commercial disputes and other matters. Certain of these contingencies are discussed above and in “Notes to the Consolidated Financial Statements” in this Annual Report on Form 10-K. The ultimate resolution of these contingencies is subject to significant uncertainty, and should we fail to prevail in any of them or should several of them be resolved against us in the same reporting period, these matters could, individually or in the aggregate, be material to the consolidated financial statements. The ultimate outcome of these matters cannot be determined at this time, nor can the amount of any potential loss be reasonably estimated, and as a result except where indicated no amounts have been recorded in our consolidated financial statements. The Company records legal costs associated with loss contingencies as expenses in the period in which they are incurred.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

INFORMATION ABOUT OUR EXECUTIVE OFFICERS

Set forth below is information concerning our executive officers and their ages as of October 31, 2019.

NAME	AGE	POSITION
David H. Li	46	President and Chief Executive Officer
Scott D. Beamer	48	Vice President and Chief Financial Officer
H. Carol Bernstein	59	Vice President, Secretary and General Counsel
Jeffrey M. Dysard	46	Vice President and President, Performance Materials
Colleen E. Mumford	43	Vice President, Communications and Marketing
Eleanor K. Thorp	45	Vice President, Human Resources
Daniel D. Woodland	49	Vice President and President, Electronic Materials
Thomas S. Roman	58	Principal Accounting Officer and Corporate Controller

DAVID H. LI has served as our President and Chief Executive Officer, and as a director of our Company, since January 2015. From June 2008 through December 2014, Mr. Li served as our Vice President of the Asia Pacific Region. Prior to that role, Mr. Li held various leadership roles throughout our business, including in regional and product line management, operations, supply chain and investor relations since joining us in 1998. Mr. Li received a B.S. in Chemical Engineering from Purdue University and an M.B.A. from Northwestern University.

SCOTT D. BEAMER has served as our Vice President and Chief Financial Officer since January 2018. Prior to joining us, Mr. Beamer served as Vice President and Chief Financial Officer of Stepan Company from August 2013. Before that, he held various senior finance roles over a 16-year career at PPG Industries, Inc., including serving as its CFO – Europe, and as its Assistant Corporate Controller. Mr. Beamer has a B.S. in Accounting from Bloomsburg University, and an M.B.A. from the University of Pittsburgh, and began his career at Ernst & Young.

H. CAROL BERNSTEIN has served as our Vice President, Secretary and General Counsel since August 2000. Prior to joining us, Ms. Bernstein served in various senior leadership roles, including as the General Counsel and Director of Industrial Technology Development of Argonne National Laboratory/the University of Chicago, and as over a thirteen-year career at the IBM Corporation, as an Associate General Counsel of the IBM Corporation, and as the Vice President, Secretary and General Counsel of Advantis Corporation, an IBM joint venture. Ms. Bernstein received her B.A. from Colgate University in History and Political Science, and her J.D. from Northwestern University; she is a member of the Bar of the States of Illinois and New York.

JEFFREY M. DYSARD has served as our Vice President and President, Performance Materials since January 2019, and prior to that had served as the General Manager of CMP Slurries, since October 2017, following serving as the General Manager of CMP Pads, from October 2015. Prior to that, Dr. Dysard held a variety of leadership roles in our R&D and product line organizations since joining us in 2004. Before that, he was a scientist with ExxonMobil. Dr. Dysard received a B.S. in Chemistry from the University of Chicago, and a Ph.D. in Chemistry from the University of California, Berkeley.

COLLEEN E. MUMFORD has served as our Vice President of Communications and Marketing since September 2019. Prior to that, Ms. Mumford served as our Corporate Relations Director since March 2018, responsible for Investor Relations, Corporate Communications and Marketing Communications. Ms. Mumford joined us in 1997, and has held various positions, including as North America Quality Director, among other leadership roles in research and development, operations, and human resources. Ms. Mumford received a B.S. in Ecology, Ethology and Evolution from the University of Illinois.

ELEANOR K. THORP has served as our Vice President, Human Resources since September 2018. Ms. Thorp rejoined our company after serving as the Head of Human Resources and Recruiting at Sephora Digital SEA, from 2015 through 2018, based in Singapore. Prior to that, Ms. Thorp was Cabot Microelectronics' Human Resources Director of Asia Pacific from 2013 through 2015. Before this, she was Head of Human Resources and Recruiting at Frontier Strategy Group, and also spent time in executive search, working across a wide range of industries, based first in London and then in New York. Ms. Thorp graduated from the University of Cambridge (England) with a B.A. in Social and Political Science.

DANIEL D. WOODLAND has served as our Vice President and President, Electronic Materials since November 2018, and prior to that had served as our Vice President and Chief Marketing and Operations Officer since October 2017 and Vice President of Marketing since January 2015. Previously, Dr. Woodland served in various product line, marketing and research and development leadership roles since joining us in 2003. Before joining our Company, Dr. Woodland held management roles at OMNOVA Solutions. Dr. Woodland received a B.A. in Physics from the University of California, Berkeley, and a Ph.D. in Physics from the University of Maine.

THOMAS S. ROMAN has served as our Corporate Controller and Principal Accounting Officer since February 2004, and prior to that served as our North American Controller after joining us in 2000. Before that, he worked for FMC Corporation, Gould Electronics, and Arthur Andersen LLP in various financial reporting, tax and audit positions. Mr. Roman is a C.P.A. and earned a B.S. in Accounting from the University of Illinois and an M.B.A. from DePaul University.

PART II

ITEM 5. MARKET FOR REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES

Our common stock has traded publicly under the symbol "CCMP" since our initial public offering in April 2000, currently on the NASDAQ Global Select Market, and formerly the NASDAQ National Market. As of October 31, 2019, there were approximately 630 holders of record of our common stock. In January 2016, we announced that our Board of Directors authorized the initiation of a regular dividend program under which the Company intends to pay quarterly cash dividends on our common stock. The declaration and payment of future dividends is subject to the discretion and determination of the Company's Board of Directors and management, based on a variety of factors, and the program may be suspended, terminated or modified at any time for any reason.

ISSUER PURCHASES OF EQUITY SECURITIES

Period	Total Number of Shares Purchased	Average Price Paid Per Share	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs	Approximate Dollar Value of Shares that May Yet Be Purchased Under the Plans or Programs (in thousands)
Jul. 1 through Jul. 31, 2019	15,660	\$ 114.66	15,000	\$ 74,554
Aug. 1 through Aug. 31, 2019	14,978	118.98	14,900	72,781
Sep. 1 through Sep. 30, 2019	11,033	137.16	11,033	71,268
Total	41,671	\$ 122.17	40,933	\$ 71,268

In January 2016, our Board of Directors authorized an increase in the amount available under our share repurchase program from the previously remaining \$75.0 million to \$150.0 million. Under this program, we repurchased 88,403 shares for \$10.0 million in fiscal 2019. As of September 30, 2019, \$71.3 million remains available under our share repurchase program. The manner in which the Company repurchases its shares is discussed in Part II, Item 7, Management's Discussion and Analysis of Financial Condition and Results of Operations, under the heading "Liquidity and Capital Resources", of this Annual Report on Form 10-K. To date, we have funded share purchases under our share repurchase program from our available cash balance, and currently anticipate we will continue to do so.

Separate from this share repurchase program, we purchased a total of 46,702 shares during fiscal 2019 pursuant to the terms of our Cabot Microelectronics Corporation 2012 Omnibus Incentive Plan, as amended ("OIP"), as shares withheld from award recipients to cover payroll taxes on the vesting of shares of restricted stock or restricted stock units awarded under the OIP.

EQUITY COMPENSATION PLAN INFORMATION

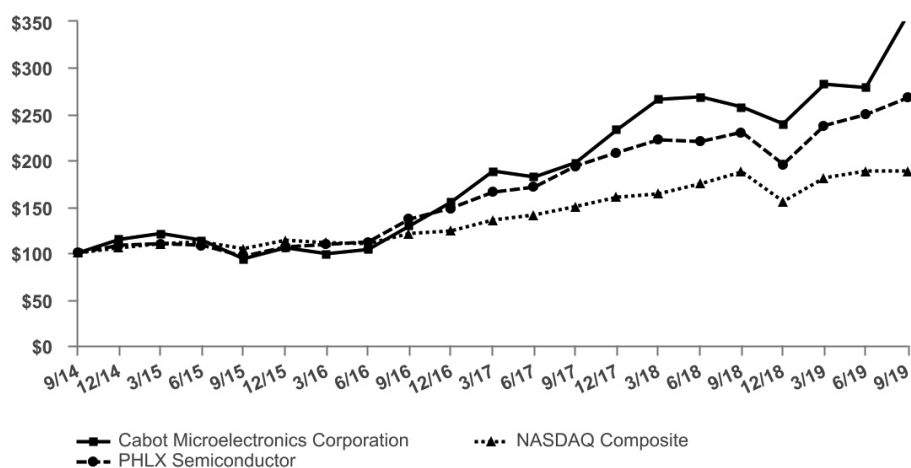
See Part III, Item 12 of this Form 10-K for information regarding shares of common stock that may be issued under the Company's existing equity compensation plans.

STOCK PERFORMANCE GRAPH

The following graph illustrates the cumulative total stockholder return on our common stock during the period from September 30, 2014 through September 30, 2019 and compares it with the cumulative total return on the NASDAQ Composite Index and the Philadelphia Semiconductor Index. The comparison assumes \$100 was invested on September 30, 2014 in our common stock and in each of the foregoing indices and assumes reinvestment of the quarterly cash dividends declared in fiscal 2016, 2017, 2018, and 2019. The performance shown is not necessarily indicative of future performance. See "Risk Factors" in Part I, Item 1A above.

COMPARISON OF 5-YEAR CUMULATIVE TOTAL RETURN*

Among Cabot Microelectronics Corporation, the NASDAQ Composite Index and the PHLX Semiconductor Index



*\$100 invested on 9/30/14 in stock or index, including reinvestment of dividends.
Fiscal year ending September 30.

	9/14	12/14	3/15	6/15	9/15	12/15	3/16	6/16	9/16	12/16	3/17
Cabot Microelectronics Corporation	\$ 100.00	\$ 114.16	\$ 120.55	\$ 113.66	\$ 93.46	\$ 105.62	\$ 99.14	\$ 103.04	\$ 129.20	\$ 154.69	\$ 188.12
NASDAQ Composite	\$ 100.00	\$ 105.70	\$ 109.70	\$ 111.93	\$ 104.00	\$ 113.06	\$ 110.31	\$ 110.05	\$ 121.08	\$ 123.08	\$ 135.55
PHLX Semiconductor	\$ 100.00	\$ 108.00	\$ 109.77	\$ 108.00	\$ 96.12	\$ 106.28	\$ 108.97	\$ 112.07	\$ 135.94	\$ 148.07	\$ 165.83

	6/17	9/17	12/17	3/18	6/18	9/18	12/18	3/19	6/19	9/19
Cabot Microelectronics Corporation	\$ 181.78	\$ 197.32	\$ 232.74	\$ 265.93	\$ 268.02	\$ 257.08	\$ 239.63	\$ 282.44	\$ 278.78	\$ 357.62
NASDAQ Composite	\$ 141.19	\$ 149.75	\$ 159.56	\$ 163.69	\$ 174.51	\$ 187.44	\$ 155.03	\$ 181.08	\$ 188.09	\$ 188.43
PHLX Semiconductor	\$ 170.59	\$ 193.86	\$ 208.10	\$ 221.52	\$ 220.25	\$ 230.10	\$ 195.52	\$ 237.27	\$ 249.56	\$ 267.81

ITEM 6. SELECTED FINANCIAL DATA

The following selected financial data for each year of the five-year period ended September 30, 2019 has been derived from the audited consolidated financial statements.

The information set forth below is not necessarily indicative of results of future operations and should be read in conjunction with "Management's Discussion and Analysis of Financial Condition and Results of Operations", "Consolidated Financial Statements" and "Notes to the Consolidated Financial Statements" included in Items 7 and 8 of Part II of this Annual Report on Form 10-K, as well as "Risk Factors" included in Item 1A of Part I of this Annual Report on Form 10-K.

CABOT MICROELECTRONICS CORPORATION SELECTED FINANCIAL DATA - FIVE YEAR SUMMARY (Amounts in thousands, except per share amounts)

	Year Ended September 30,				
	2019	2018	2017	2016	2015
Consolidated Statements of Income Data:					
Revenue	\$ 1,037,696	\$ 590,123	\$ 507,179	\$ 430,449	\$ 414,097
Cost of sales	595,043	276,018	253,050	220,247	201,866
Gross profit	442,653	314,105	254,129	210,202	212,231
Operating expenses:					
Research, development and technical	51,707	51,950	54,798	58,532	59,778
Selling, general and administrative	213,078	102,037	86,483	77,162	77,413
Asset impairment charges	67,372	—	860	—	—
Total operating expenses	332,157	153,987	142,141	135,694	137,191
Operating income	110,496	160,118	111,988	74,508	75,040
Interest expense	45,681	2,905	4,529	4,723	4,524
Interest income	2,346	4,409	2,351	949	365
Other income (expense), net	(4,055)	89	(438)	(296)	316
Income before income taxes	63,106	161,711	109,372	70,438	71,197
Provision for income taxes	23,891	51,668	22,420	10,589	15,051
Net income	\$ 39,215	\$ 110,043	\$ 86,952	\$ 59,849	\$ 56,146
Basic earnings per share	\$ 1.37	\$ 4.31	\$ 3.47	\$ 2.47	\$ 2.32
Weighted average basic shares outstanding	28,571	25,518	25,015	24,077	24,040
Diluted earnings per share	\$ 1.35	\$ 4.19	\$ 3.40	\$ 2.43	\$ 2.26
Weighted average diluted shares outstanding	29,094	26,243	25,512	24,477	24,632

As of September 30,

	2019	2018	2017	2016	2015
Consolidated Balance Sheets Data:					
Cash and cash equivalents	\$ 188,495	\$ 352,921	\$ 397,890	\$ 287,479	\$ 354,190
Other current assets	320,061	169,860	153,092	149,351	140,318
Property, plant and equipment, net	276,818	111,403	106,361	106,496	93,743
Other assets	1,476,392	146,789	176,757	183,904	72,223
Total assets	<u>\$ 2,261,766</u>	<u>\$ 780,973</u>	<u>\$ 834,100</u>	<u>\$ 727,230</u>	<u>\$ 660,474</u>
Current liabilities	\$ 171,460	\$ 101,154	\$ 91,213	\$ 65,885	\$ 60,644
Long-term debt	928,463	—	132,997	146,961	155,313
Other long-term liabilities	181,466	13,127	14,853	16,736	15,553
Total liabilities	1,281,389	114,281	239,063	229,582	231,510
Stockholders' equity	980,377	666,692	595,037	497,648	428,964
Total liabilities and stockholders' equity	<u>\$ 2,261,766</u>	<u>\$ 780,973</u>	<u>\$ 834,100</u>	<u>\$ 727,230</u>	<u>\$ 660,474</u>

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

The following "Management's Discussion and Analysis of Financial Condition and Results of Operations" (MD&A), as well as disclosures included elsewhere in this Annual Report on Form 10-K, include "forward-looking statements" within the meaning of the Private Securities Litigation Reform Act of 1995. This Act provides a safe harbor for forward-looking statements to encourage companies to provide prospective information about themselves so long as they identify these statements as forward-looking and provide meaningful cautionary statements identifying important factors that could cause actual results to differ from the projected results. All statements other than statements of historical fact we make in this Annual Report on Form 10-K are forward-looking and address a variety of subjects including, for example, future sales and operating results; growth or contraction, and trends in the industry and markets in which the Company participates; the acquisition of, investment in, or collaboration with other entities, including the Company's acquisition of KMG Chemicals, Inc. ("KMG"), and the expected benefits and synergies of such acquisition; divestment or disposition, or cessation of investment in certain, of the Company's businesses; new product introductions; development of new products, technologies and markets; product performance; the financial conditions of the Company's customers; competitive landscape; the Company's supply chain; natural disasters; various economic or political factors and international or national events, including related to the enactment of trade sanctions, tariffs, or other similar matters; the generation, protection and acquisition of intellectual property, and litigation related to such intellectual property or third party intellectual property; environmental, health and safety laws and regulations, and related compliance; the operation of facilities by Cabot Microelectronics; the Company's management; foreign exchange fluctuation; the Company's current or future tax rate, including the effects of the Tax Cuts and Jobs Act in the United States ("tax act"); cybersecurity threats; financing facilities and related debt, pay off or payment of principal and interest, and compliance with covenants and other terms; and, uses and investment of the Company's cash balance, including dividends and share repurchases, which may be suspended, terminated or modified at any time for any reason by the Company, based on a variety of factors. Statements that are not historical facts, including statements about Cabot Microelectronics' beliefs, plans and expectations, are forward-looking statements. Such statements are based on current expectations of Cabot Microelectronics' management and are subject to a number of factors and uncertainties, which could cause actual results to differ materially from those described in the forward-looking statements. Except as required by law, Cabot Microelectronics undertakes no obligation to update forward-looking statements made by it to reflect new information, subsequent events or circumstances. The section entitled "Risk Factors" describes some, but not all, of the factors that could cause these differences.

The following discussion and analysis should be read in conjunction with our historical financial statements and "Notes to the Consolidated Financial Statements" which are included in Item 8 of Part II of this Annual Report on Form 10-K.

OVERVIEW

Cabot Microelectronics Corporation ("Cabot Microelectronics", "the Company", "us", "we", or "our") is a leading global supplier of consumable materials to semiconductor manufacturers and pipeline companies. As discussed above, on November 15, 2018 ("Acquisition Date"), we completed our acquisition of KMG Chemicals, Inc. ("KMG"), which produces and distributes specialty chemicals and performance materials for the semiconductor industry, pipeline operations and adjacent industries, and industrial wood preservation industry ("Acquisition"). The Acquisition has extended and strengthened our position as one of the leading suppliers of consumable materials to the semiconductor industry and has expanded our portfolio with the addition of KMG's performance materials business, which enables us to be a leading global provider of performance products and services to the pipeline operations industry. The Consolidated Financial Statements included in this Annual Report on Form 10-K include the financial results of KMG from the Acquisition Date. Subsequent to the Acquisition, we operate our business within two reportable segments: Electronic Materials and Performance Materials. The Electronic Materials segment consists of our heritage CMP slurries and polishing pads businesses, as well as the recently-acquired KMG electronic chemicals business. The Performance Materials segment includes KMG's heritage pipeline performance and wood treatment businesses, and our heritage QED business. For additional information, refer to Part 1, Item 1, "Business", in this Annual Report on Form 10-K.

In the Electronic Materials segment, we recorded record revenue in fiscal 2019, primarily due to the Acquisition. We had lower CMP slurries revenue in fiscal 2019 compared to fiscal year 2018, which was partially offset by higher revenue in CMP pads and the addition of revenue in electronic chemicals. We believe this decline in CMP slurries revenue was due to the softness in the semiconductor industry in fiscal 2019, primarily in the memory sector. CMP slurries have a high participation in the memory sector, and were adversely impacted by the decrease in DRAM and NAND production at our customers during our fiscal 2019. In logic applications, the transition to advanced nodes by many of our top customers is driving increased demand for materials, particularly electronic chemicals. We believe that new applications in areas such as mobile, artificial intelligence (AI), and blockchain will continue to drive demand for advanced logic semiconductor devices going forward. In addition, the legacy logic and foundry area of the industry continues to benefit from growth in applications such as internet of things, autonomous driving, industrial automation, cloud and high-performance computing, virtual reality, and 5G. We believe we remain well-positioned to benefit from these long-term demand trends. Despite some industry headwinds that impacted demand for our CMP slurries, performance in CMP pads and the acquired KMG businesses more than offset these headwinds, reflecting the strength of our acquired KMG businesses, the resiliency of our heritage CMP business, and the breadth of our product offerings. Later in fiscal 2019, as channel inventories appeared to be reduced and demand from multiple end markets improved, we began to see signs of stabilization in the semiconductor industry and improvement in demand for our CMP slurries from advanced logic, foundry and memory customers. However, there are many factors that make it difficult for us to predict future revenue trends for our business, including those discussed in Part I, Item 1A entitled "Risk Factors" in this Annual Report on Form 10-K.

In our Performance Materials segment, we recorded record revenue in fiscal 2019, primarily driven by the Acquisition. We have experienced strong demand for our DRAs in our pipeline performance business. These products enable pipeline operators to optimize the efficiency and throughput of oil transport in both United States and international oil production.

Revenue for fiscal 2019 was \$1,037.7 million, which represented an increase of 75.8% from the \$590.1 million reported for fiscal 2018, primarily due to the Acquisition.

Net income was \$39.2 million in fiscal 2019, which represented a decrease of 64.4% or \$70.8 million, from \$110.0 million in fiscal 2018. Results benefited from the Acquisition, but were more than offset by Acquisition-related expenses, asset impairment charges and a restructuring charge related to wood treatment, increased amortization and depreciation associated with re-valuing KMG assets to fair value, cleanup and disposal costs related to a warehouse fire at our wood treatment facility in Tuscaloosa, Alabama, higher Interest expense resulting from the debt borrowing to finance the Acquisition, and newly issued final regulations related to the United States Tax Cut and Jobs Act ("Tax Act"), which impacted our reserves for uncertain tax positions. For the same reasons, Diluted earnings per share decreased from \$4.19 in fiscal 2018 to \$1.35 in fiscal 2019. See Note 21 of "Notes to the Consolidated Financial Statements" included in Part II, Item 8 of this Annual Report on Form 10-K.

Adjusted EBITDA was \$333.4 million in fiscal 2019. This represents an increase of \$143.5 million, or 75.5% from \$189.9 million in fiscal 2018. Adjusted EBITDA benefited from the Acquisition of the KMG businesses, partially offset by the softer industry conditions that resulted in lower demand for our heritage CMP products. Refer to the "Use of certain GAAP and Non-GAAP Financial Information" section below for the definition of adjusted EBITDA and a reconciliation of adjusted EBITDA to Net income, the most comparable GAAP financial measure. Adjusted EBITDA margin, which represents adjusted EBITDA as a percentage of revenue, was 32.1% and 32.2% for fiscal 2019 and 2018, respectively.

CRITICAL ACCOUNTING POLICIES AND ESTIMATES

This MD&A, as well as disclosures included elsewhere in this Annual Report on Form 10-K, are based upon our audited consolidated financial statements, which have been prepared in accordance with accounting principles generally accepted in the United States. The preparation of these financial statements requires us to make estimates and judgments that affect the reported amounts of assets, liabilities, revenues and expenses, and related disclosure of contingencies. On an ongoing basis, we evaluate the estimates used, including those related to business combinations, asset retirement obligations, impairment of long-lived assets, goodwill and other intangible assets, income taxes and contingencies. We base our estimates on historical experience, current conditions and on various other assumptions that we believe to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources, as well as for identifying and assessing our accounting treatment with respect to commitments and contingencies. Actual results may differ from these estimates under different assumptions or conditions. We believe the following critical accounting policies involve significant judgments and estimates used in the preparation of our consolidated financial statements.

BUSINESS COMBINATIONS

We account for our acquisitions under the current standards of accounting for business combinations. These standards require assets and liabilities of an acquired business to be recognized at their estimated fair value. We engage independent third-party appraisal firms to assist us in determining the fair values of assets and liabilities acquired. This valuation requires management to make significant estimates and assumptions, especially with respect to long-lived and intangible assets. Goodwill represents the residual value of the purchase price over the fair value of net assets acquired, including identifiable intangible assets.

Critical estimates in valuing certain of the intangible assets include but are not limited to: future expected cash flows related to customer relationships, trade names, acquired developed technologies, and patents and assumptions about the period of time the technologies will continue to be used in the Company's product portfolio; expected costs to develop the in-process technology into commercially viable products and estimated cash flows from the products when completed; and, discount rates. Management's estimates of value are based upon assumptions believed to be reasonable, but which are inherently uncertain and unpredictable. Assumptions may be incomplete or inaccurate, and unanticipated events and circumstances may occur that may cause actual realized values to be different from management's estimates.

ASSET RETIREMENT OBLIGATIONS

Asset Retirement Obligations (AROs) are the obligations associated with the retirement of tangible long-lived assets. The Company recognizes an ARO liability in the period in which it is incurred, including upon acquisition, if a reasonable estimate of fair value can be made. If a reasonable estimate of fair value cannot be made in the period in which the ARO is incurred, the liability shall be recognized when a reasonable estimate of fair value can be made.

The Company recognizes AROs for the removal or storage of hazardous materials, decontamination or demolition of above ground storage tanks (ASTs), and certain restoration and decommissioning obligations related to certain of our owned and leased properties. AROs are initially recorded at an estimate of fair value by discounting to present value the expected future cash flows. In subsequent periods, the Company recognizes accretion expense in Cost of sales increasing the ARO balances, such that the balance will ultimately equal the expected cash flows at the time of settlement.

The Company has multiple production facilities with an indeterminate useful life and there is insufficient information available to estimate a range of potential settlement dates for the obligation. Therefore, the Company cannot reasonably estimate the fair value of the liability.

IMPAIRMENT OF LONG-LIVED ASSETS

We assess the recoverability of the carrying value of long-lived assets to be held and used whenever events or changes in circumstances indicate that the carrying value may not be recoverable. We must exercise judgment in assessing whether an event of impairment has occurred. For purposes of recognition and measurement of an impairment loss, long-lived assets are either individually identified or grouped with other assets and liabilities at the lowest level for which identifiable cash flows are largely independent of the cash flows of other assets and liabilities. We must exercise judgment in this grouping. The carrying value of a long-lived asset is considered impaired when the total projected undiscounted cash flows from the use and eventual disposition of the asset or asset group are separately identifiable and are less than its carrying value. In that event, a loss is recognized based on the amount by which the carrying value exceeds the fair value of the long-lived asset. The fair value methodology used is an estimate of fair market value, which is made based on prices of similar assets or other valuation methodologies, including present value techniques. Long-lived assets to be disposed of by means other than sale are classified as held for use until their disposal. Long-lived assets to be disposed of by sale are classified as held for sale and are reported at the lower of carrying amount or fair market value, less the estimated cost to sell. Depreciation is discontinued for any long-lived assets classified as held for sale.

In the fourth quarter of fiscal 2019, we recorded an impairment of \$67.4 million of long-lived assets, including a \$4.1 million impairment of Property, plant and equipment in the wood treatment asset group. See Note 10 of "Notes to the Consolidated Financial Statements" included in Part II, Item 8 of this Annual Report on Form 10-K for a more detailed discussion of the impairment. We did not record any impairment expense in fiscal 2018. We recorded impairment expense on long-lived assets of \$0.9 million in fiscal 2017 related to surplus research and development equipment, which was subsequently sold for a gain.

GOODWILL AND OTHER INTANGIBLE ASSETS

Purchased intangible assets with finite lives are amortized over their estimated useful lives and are evaluated for impairment using a process similar to that used to evaluate other long-lived assets. Goodwill and indefinite lived intangible assets are not amortized and are tested annually in our fourth fiscal quarter or more frequently if indicators of potential impairment exist, using a fair-value-based approach. The recoverability of goodwill is measured at the reporting unit level, which is defined as either an operating segment or one level below an operating segment. A component is a reporting unit when it constitutes a business for which discrete financial information is available and segment management regularly reviews the operating results of the component. Components may be combined into one reporting unit when they have similar economic characteristics. We have six reporting units, all of which had goodwill as of September 30, 2019, the date of our annual impairment test.

The Company's Electronic Materials segment is comprised of the three following reporting units: CMP slurries, electronic chemicals, and CMP pads. The Company's Performance Materials segment is comprised of three additional reporting units: pipeline performance, wood treatment, and precision optics.

Accounting guidance provides an entity the option to assess the fair value of a reporting unit either using a qualitative analysis ("step zero") or a quantitative analysis ("step one"). We used a step zero qualitative analysis for the CMP slurries reporting unit in fiscal 2018 and 2019, and for Precision Optics in fiscal 2019. Aside from those previously noted, all other reporting units were assessed for goodwill impairment using a step one approach. The Flowchem trade name, an indefinite-lived intangible asset, was assessed for impairment using a relief from royalty approach.

Factors requiring significant judgment include the selection of valuation approach and assumptions related to future revenue, discount factors, terminal growth rates, and royalty rates, among others. Changes in economic and operating conditions that occur after the annual impairment analysis or an interim impairment analysis that impact these assumptions may result in future impairment charges.

In the fourth quarter of fiscal 2019, the Company performed its annual goodwill impairment assessment, comparing estimated fair values of the reporting units to their carrying amounts. In estimating the fair values, the Company used the average of an income approach, discounting estimated future cash flows, and a market approach based upon relevant market multiples. As a result of asset impairment charges recorded in the fourth quarter of fiscal 2019, the carrying value of the wood treatment reporting unit is equal to its fair value. In this circumstance with no excess of fair value over carrying value, any unfavorable variances from the estimated inputs used in the impairment assessment may result in further impairment of long-lived assets or goodwill. The Company's Electronic Chemicals reporting unit has goodwill resulting from a recent acquisition, with a greater sensitivity to impairment, due to the extent by which its estimated fair value exceeds its carrying value. Changes to the assumptions requiring significant judgment, noted above, could result in a different outcome for the impairment assessment. Accordingly, the Company performed sensitivity analysis for selected key assumptions.

As a result of the review performed in the fourth quarter of fiscal 2019, and the related sensitivity analysis, we determined that there was no impairment of our goodwill as of September 30, 2019. There was no goodwill impairment recorded in fiscal 2018 or 2017.

While no goodwill impairments were recognized in fiscal 2019, the Company recognized asset impairment charges of \$67.4 million, of which \$63.3 million related to Other intangible assets, net for the wood treatment reporting unit due to triggering events that occurred in the fourth quarter of fiscal 2019. See Note 10 of "Notes to the Consolidated Financial Statements" included in Part II, Item 8 of this Annual Report on Form 10-K. The Company will continue to monitor the wood treatment asset group for indicators of long-lived asset or goodwill impairment. Absent a sale of the business, as the Company approaches the announced closure date of the facilities and there are fewer estimated future cash flows, there is ongoing potential for further impairments of long-lived assets and impairment of goodwill. While the timing and amounts of any further impairments are unknown, they could be material to the Company's Consolidated Balance Sheets and to the Consolidated Statements of Income, but they will not affect the Company's reported Net cash provided by operating activities.

ACCOUNTING FOR INCOME TAXES

Current income taxes are determined based on estimated taxes payable or refundable on tax returns for the current year. Deferred income taxes are determined using enacted tax rates for the effect of temporary differences between the book and tax bases of recorded assets and liabilities. The effect on deferred tax assets and liabilities of changes in tax rates is recognized in income in the period that includes the enactment date. Provisions are made for both United States and any foreign deferred income tax liability or benefit. We assess whether or not our deferred tax assets will ultimately be realized, and record an estimated valuation allowance on those deferred tax assets that may not be realized. We recognize the tax benefit of an uncertain tax position only if it is more likely than not that the tax position will be sustained by the taxing authorities, based on the technical merits of the position. In fiscal 2017, we maintained an assertion to permanently reinvest the earnings of all of our foreign subsidiaries. In light of the Tax Act and the associated transition to a modified territorial tax system, we no longer consider our foreign earnings to be indefinitely reinvested. See Note 19 of "Notes to the Consolidated Financial Statements" included in Part II, Item 8 of this Annual Report on Form 10-K for additional information on income taxes.

COMMITMENTS AND CONTINGENCIES

We have entered into certain unconditional purchase obligations, which include noncancelable purchase commitments and take-or-pay arrangements with suppliers. We review our agreements on a quarterly basis and make an assessment of the likelihood of a shortfall in purchases and determine if it is necessary to record a liability. In addition, we are subject to the possibility of various loss contingencies arising in the ordinary course of business, such as a legal proceeding or claim. An estimated loss contingency is accrued when it is probable that an asset has been impaired, or a liability has been incurred and the amount of the loss can be reasonably estimated. We regularly evaluate information available to us to determine whether such accruals should be adjusted and whether new accruals are required.

EFFECTS OF RECENT ACCOUNTING PRONOUNCEMENTS

See Note 2 of "Notes to the Consolidated Financial Statements" included in Part II, Item 8 of this Annual Report on Form 10-K for a description of recent accounting pronouncements including the expected dates of adoption and effects on our results of operations, financial position and cash flows.

RESULTS OF OPERATIONS

The following table sets forth, for the periods indicated, the percentage of revenue of certain line items included in our historical statements of income:

	Year Ended September 30,		
	2019	2018	2017
Revenue	100.0 %	100.0 %	100.0 %
Cost of sales	57.3	46.8	49.9
Gross profit	42.7	53.2	50.1
Research, development and technical	5.0	8.8	10.8
Selling, general and administrative	20.5	17.2	17.1
Asset impairment charges	6.5	—	0.2
Operating income	10.7	27.1	22.1
Interest expense	4.4	0.5	0.9
Interest income	0.2	0.7	0.5
Other income (expense), net	(0.4)	0.1	(0.1)
Income before income taxes	6.1	27.4	21.5
Provision for income taxes	2.3	8.8	4.4
Net income	3.8 %	18.6 %	17.1 %

YEAR ENDED SEPTEMBER 30, 2019, VERSUS YEAR ENDED SEPTEMBER 30, 2018

REVENUE

Revenue was \$1,037.7 million in fiscal 2019, which represented an increase of 75.8%, or \$447.6 million, from fiscal 2018. The increase in revenue was primarily driven by the Acquisition. Revenue from Cabot Microelectronics' heritage businesses decreased by \$3.3 million, or 0.6%, driven by a \$30.9 million decrease due to lower sales volume and a \$5.6 million decrease due to foreign exchange fluctuations, partially offset by a \$30.3 million increase due to a higher value product mix, and \$2.9 million increase due to price changes.

COST OF SALES

Total Cost of sales was \$595.0 million in fiscal 2019, which represented an increase of 115.6%, or \$319.0 million, from fiscal 2018. The increase in Cost of sales was primarily due to the Acquisition. The Cost of sales from Cabot Microelectronics' heritage businesses decreased by \$7.5 million. The decrease was driven by a \$6.2 million decrease due to lower sales volume, and a \$3.2 million decrease due to foreign exchange fluctuations, partially offset by a \$3.0 million increase in freight and packaging costs. Cost of sales included \$14.9 million fair value write-up of KMG-acquired inventory sold and \$9.5 million related to the KMG-Bernuth warehouse fire.

GROSS MARGIN

Our gross margin was 42.7% in fiscal 2019 compared to 53.2% in fiscal 2018. The gross margin was adversely impacted by the inclusion of the KMG businesses, which reduced margin by 11.6%, of which 1.4% was due to the impact of the fair value write-up of acquired inventory sold, 0.9% was due to the costs related to the KMG-Bernuth warehouse fire, and 0.7% was due amortization of Acquisition-related costs. Within Cabot Microelectronics' heritage businesses, gross margin increased by 1.0%, which was primarily due to a higher value product mix, partially offset by lower volume and higher freight and packaging costs.

RESEARCH, DEVELOPMENT AND TECHNICAL

Total Research, development and technical expenses were \$51.7 million in fiscal 2019, which represented a decrease of 0.5%, or \$0.2 million, from fiscal 2018. The decrease was primarily due to lower staffing-related costs of \$2.4 million, including incentive compensation costs, partially offset by higher supplies and equipment costs used in research and development of \$2.1 million.

Our Research, development and technical efforts are focused on the areas of research related to fundamental CMP technology; development of new and enhanced CMP consumable products, including collaboration on joint development projects with technology-leading customers and suppliers; process development to support rapid and effective commercialization of new products; technical support of CMP products in our customers' research, development and manufacturing facilities; and, development of polishing and metrology applications outside of the semiconductor industry.

SELLING, GENERAL AND ADMINISTRATIVE

Selling, general and administrative expenses were \$213.1 million in fiscal 2019, which represented an increase of 108.8%, or \$111.0 million, from fiscal 2018. The increase was primarily due to \$45.5 million of amortization expense related to the Acquisition, \$38.4 million in incremental KMG-related costs associated with the post-Acquisition period during fiscal 2019, and \$34.7 million of Acquisition and integration related costs. These items were partially offset by the absence of executive officer transition costs of \$4.2 million that occurred in the first quarter of fiscal 2018.

ASSET IMPAIRMENT CHARGES

Asset impairment charges were \$67.4 million in fiscal 2019 due to impairment of the long-lived assets in the wood treatment asset group. See Note 10 of "Notes to the Consolidated Financial Statements" included in Item 8 of Part II of this Annual Report on Form 10-K.

INTEREST EXPENSE

Interest expense was \$45.7 million in fiscal 2019, which represented an increase of \$42.8 million, from fiscal 2018. The increase resulted from the debt borrowing to finance the Acquisition.

INTEREST INCOME

Interest income was \$2.3 million in fiscal 2019, which represented a decrease of 46.8%, or \$2.1 million from fiscal 2018 due to lower cash balances.

OTHER INCOME (EXPENSE), NET

Other expense was \$4.1 million in fiscal 2019, which increased from Other income of \$0.1 million in fiscal 2018. The increase was primarily due to higher loss on foreign exchange, the absence of the gain on sale of assets of \$1.0 million, and gain on the termination of interest rate swap agreements that occurred in fiscal 2018.

PROVISION FOR INCOME TAXES

Our effective income tax rate was 37.9% in fiscal 2019 compared to 32.0% in fiscal 2018. The increase in the effective tax rate during fiscal 2019 was primarily due to newly issued final regulations related to the Tax Act, which impacted our reserves for uncertain tax positions, unfavorable tax treatment of certain Acquisition-related costs, such as compensation deduction limitations, as well as non-deductibility of certain professional fees. Partially offsetting these adverse items, the Tax Act reduced the corporate income tax rate to 21.0% effective January 1, 2018, resulting in a change in our blended tax rate of 24.5% in fiscal 2018 to 21.0% beginning with our fiscal 2019.

NET INCOME

Net income was \$39.2 million in fiscal 2019, which represented a decrease of 64.4%, or \$70.8 million, from fiscal 2018. The fiscal 2019 Net income was adversely impacted by the asset impairment and restructuring charges related to the wood treatment business of \$68.9 million, Acquisition-related expenses of \$34.7 million, a charge for fair value write-up of acquired inventory sold of \$14.9 million, costs related to the KMG-Bernuth warehouse fire of \$9.9 million, and increased tax expense related to newly issued final regulations related to the Tax Act, which impacted the Company's reserves for uncertain tax positions, offset by the increase due to the addition of KMG businesses.

YEAR ENDED SEPTEMBER 30, 2018, VERSUS YEAR ENDED SEPTEMBER 30, 2017

REVENUE

Revenue was \$590.1 million in fiscal 2018, which represented an increase of 16.4%, or \$82.9 million, from fiscal 2017. The increase in revenue was driven by a \$52.9 million increase due to higher sales volume, a \$27.5 million increase due to a higher value product mix, and a \$4.4 million increase due to foreign exchange fluctuations, partially offset by a \$1.8 million decrease due to price changes. The increase in sales volume was consistent with continued overall strong demand conditions in the global semiconductor industry.

COST OF SALES

Total Cost of sales was \$276.0 million in fiscal 2018, which represented an increase of 9.1%, or \$23.0 million, from fiscal 2017. The increase in Cost of sales was primarily driven by a \$12.4 million increase due to higher sales volume, a \$6.6 million increase in fixed manufacturing costs, including higher staffing-related expenses, a \$2.9 million increase due to product mix, a \$2.0 million increase due to foreign exchange fluctuations, partially offset by a \$1.0 million decrease in other variable manufacturing costs, including material costs. Fixed manufacturing costs included \$5.2 million of NexPlanar amortization expense compared to \$4.8 million in the same period of fiscal 2017.

GROSS MARGIN

Our gross margin was 53.2% in fiscal 2018 compared to 50.1% for fiscal 2017. The increase in gross margin from fiscal 2017 was primarily due to higher sales volume and a higher value product mix, partially offset by higher fixed manufacturing costs, including higher staffing-related expenses.

RESEARCH, DEVELOPMENT AND TECHNICAL

Total Research, development and technical expenses were \$52.0 million in fiscal 2018, which represented a decrease of 5.2%, or \$2.8 million, from fiscal 2017. The decrease was primarily due to lower professional expenses of \$1.3 million, lower staffing-related costs of \$1.0 million, and lower depreciation and amortization expense of \$0.7 million, partially offset by the absence of a gain on equipment disposal of \$1.8 million that occurred in fiscal 2017.

SELLING, GENERAL AND ADMINISTRATIVE

Selling, general and administrative expenses were \$102.0 million in fiscal 2018, which represented an increase of 18.0%, or \$15.6 million, from fiscal 2017. The increase was primarily due to \$4.2 million in costs associated with executive officer transitions, \$3.9 million in Acquisition and integration related costs in connection with the Acquisition, higher long-term incentive compensation expenses of \$2.5 million, higher staffing-related costs of \$1.6 million, and higher professional expenses of \$1.5 million.

INTEREST EXPENSE

Interest expense was \$2.9 million in fiscal 2018, which represented a decrease of 35.9%, or \$1.6 million, from fiscal 2017. The decrease resulted from the payoff of our Term Loan in April 2018.

INTEREST INCOME

Interest income was \$4.4 million in fiscal 2018, which represented an increase of 87.5%, or \$2.1 million, from fiscal 2017. The increase resulted from higher investment balances and higher average interest rates.

OTHER INCOME (EXPENSE), NET

Other income was \$0.1 million in fiscal 2018, an increase of \$0.5 million from fiscal 2017. The increase was primarily due to the gain on the sale of certain assets of \$1.0 million in the second quarter of fiscal 2018.

PROVISION FOR INCOME TAXES

Our effective income tax rate was 32.0% in fiscal 2018 compared to 20.5% in fiscal 2017. The increase in the effective tax rate during fiscal 2018 was primarily due to the unfavorable initial impact of the Tax Act, which was enacted in the first quarter of fiscal 2018, and the absence of benefits of the tax holiday in South Korea, which expired as of October 2017. These items were partially offset by the benefit from the adoption of ASU 2016-09 in fiscal 2018, which requires excess tax benefits of share based exercises to be recorded as a reduction to the Provision for income taxes, rather than an increase to equity. See Note 19 of "Notes to the Consolidated Financial Statements" included in Part II, Item 8 of this Annual Report on Form 10-K for more information on our income tax provision.

NET INCOME

Net income was \$110.0 million in fiscal 2018, which represented an increase of 26.6%, or \$23.1 million, from fiscal 2017. The increase was primarily due to higher revenue and a higher gross margin, partially offset by higher operating expenses and the \$18.2 million unfavorable initial impact of the enactment of the Tax Act in December 2017.

SEGMENT ANALYSIS

Segment data is presented for our two reportable segments for the fiscal year ended September 30, 2019 and 2018. The segment data should be read in conjunction with our Consolidated Financial Statements and related notes included elsewhere in this Annual Report on Form 10-K.

Revenue from external customers by segment and adjusted EBITDA/Margin are as follows:

	Twelve Months Ended September 30,		
	2019	2018	2017
Segment Revenue			
Electronic Materials	\$ 833,051	\$ 559,944	\$ 485,034
Performance Materials	204,645	30,179	22,145
Total	\$ 1,037,696	\$ 590,123	\$ 507,179

	Twelve Months Ended September 30,		
	2019	2018	2017
Segment Adjusted EBITDA:			
Electronic Materials	\$ 294,902	\$ 222,019	\$ 169,044
Performance Materials	91,372	7,191	2,516
Unallocated corporate expenses	(52,856)	(39,266)	(34,050)
Total	\$ 333,418	\$ 189,944	\$ 137,510

	Twelve Months Ended September 30,		
	2019	2018	2017
Adjusted EBITDA Margin			
Electronic Materials	35.4 %	39.7 %	34.9 %
Performance Materials	44.6 %	23.8 %	11.4 %

THE YEAR ENDED SEPTEMBER 30, 2019, VERSUS YEAR ENDED SEPTEMBER 30, 2018

ELECTRONIC MATERIALS

The \$273.1 million increase in Electronic Materials revenue was primarily driven by the addition of KMG's electronic chemicals business since the Acquisition. Further increase was driven by higher value product mix and strong organic demand for the Company's heritage CMP pads product line, which increased 13.8%, primarily on higher sales volume, partially offset by the decrease in Company's heritage CMP slurries products due to the softer industry conditions. The increase in adjusted EBITDA for Electronic Materials increased from the prior year was driven by the addition of KMG's electronic chemicals, as well as stronger profitability, driven by the leverage achieved on higher sales volume of the Company's legacy CMP polishing pads product line. The lower adjusted EBITDA margin was primarily due to change in mix of products as a result of the Acquisition.

PERFORMANCE MATERIALS

The \$174.5 million increase in Performance Materials revenue was primarily driven by the addition of KMG's performance materials business post-Acquisition. Performance Materials' adjusted EBITDA and adjusted EBITDA margin expanded from the prior year due to the addition of KMG's heritage performance materials business.

USE OF CERTAIN GAAP AND NON-GAAP FINANCIAL INFORMATION

We provide certain non-GAAP financial information, such as adjusted EBITDA and adjusted EBITDA margin, to complement reported GAAP results because we believe that analysis of our financial performance is enhanced by an understanding of these non-GAAP financial measures. We exclude certain items from earnings when presenting our adjusted EBITDA measure because we believe they will be incurred infrequently and/or are otherwise not indicative of a segment's regular, ongoing operating performance. Accordingly, we believe that they aid in evaluating the underlying operational performance of our business, and facilitate comparisons between periods. In addition, adjusted EBITDA is used as a basis of the performance metric for our fiscal 2019 Short-Term Incentive Program (STIP). A similar EBITDA calculation is also used by our lenders for a key debt compliance ratio.

Adjusted EBITDA margin is defined as adjusted EBITDA as a percentage of revenue. Adjusted EBITDA is defined as earnings before interest, income taxes, depreciation and amortization, adjusted for certain items that affect comparability from period to period. These adjustments include items related to the Acquisition, such as expenses incurred to complete the Acquisition and integration related expenses, costs of restructuring and asset impairment related to the wood treatment business, costs related to the KMG-Bernuth warehouse fire, and impact of fair value adjustments to inventory acquired from KMG.

The non-GAAP financial information provided is a supplement to, and not a substitute for, the Company's financial results presented in accordance with U.S. GAAP. Management strongly encourages investors to review the Company's consolidated financial statements in their entirety and to not rely on any single financial measure. These non-GAAP financial measures are provided to enhance the investor's understanding about the Company's ongoing operations. Specifically, the Company believes the impact of Acquisition-related expenses and Acquisition-related amortization expenses are not indicative of its core operating results, and thus presents these certain metrics excluding these effects. The presentation of non-GAAP financial information is not meant to be considered in isolation or as a substitute for results prepared and presented in accordance with U.S. GAAP. A reconciliation table of GAAP to non-GAAP financial measures is contained below.

Adjusted EBITDA for the Electronic Materials and Performance Materials segments is presented in conformity with Accounting Standards Codification Topic 280, Segment Reporting. This measure is reported to the chief operating decision maker for purposes of making decisions about allocating resources to the segments and assessing their performance. For these reasons, this measure is excluded from the definition of non-GAAP financial measures under the SEC Regulation G and Item 10(e) of Regulation S-K.

RECONCILIATION OF NET INCOME TO ADJUSTED EBITDA

The table below presents the reconciliation of Net income to adjusted EBITDA. Adjusted EBITDA is not a measurement of our financial performance under GAAP and should not be considered as an alternative to Net income. Adjusted EBITDA may have limitations as an analytical tool and should not be considered in isolation or as a substitute for analysis of our results as reported under GAAP.

	Twelve Months Ended September 30,		
	2019	2018	2017
Segment Adjusted EBITDA			
Electronic Materials	\$ 294,902	\$ 222,019	\$ 169,044
Performance Materials	91,372	7,191	2,516
Unallocated Corporate Expenses	(52,856)	(39,266)	(34,050)
Total	<u>\$ 333,418</u>	<u>\$ 189,944</u>	<u>\$ 137,510</u>

	Twelve Months Ended September 30,		
	2019	2018	2017
Net income	\$ 39,215	\$ 110,043	\$ 86,952
Interest expense	45,681	2,905	4,529
Interest income	(2,346)	(4,409)	(2,351)
Income taxes	23,891	51,668	22,420
Depreciation and amortization	98,592	25,876	25,930
EBITDA*	205,033	186,083	137,480
Acquisition and integration related expense	34,709	3,861	—
Charge for fair value write-up of acquired inventory sold	14,869	—	—
Cost related to KMG-Bernuth warehouse fire	9,905	—	—
Costs related to restructuring of wood treatment business	1,530	—	—
Charges related to asset impairment of wood treatment business	67,372	—	—
Adjusted EBITDA**	<u>\$ 333,418</u>	<u>\$ 189,944</u>	<u>\$ 137,480</u>

* EBITDA represents earnings before interest, taxes, depreciation and amortization.

** Adjusted EBITDA is calculated by excluding items from EBITDA that are believed to be infrequent or not indicative.

LIQUIDITY AND CAPITAL RESOURCES

We generated \$175.0 million in cash flows from operating activities in fiscal 2019, \$168.9 million in fiscal 2018 and \$141.4 million in fiscal 2017. Our cash provided by operating activities in fiscal 2019 reflected Net income of \$39.2 million, \$175.2 million in non-cash items reconciling items, including \$67.4 million related to the wood treatment asset impairment charges partially offset by increases in working capital of \$39.4 million. Our cash provided by operating activities in fiscal 2018 reflected Net income of \$110.0 million, \$66.8 million in non-cash reconciling items. The increase in cash flows from operating activities in fiscal 2018 was primarily due to higher revenue and gross margin, partially offset by an increase in working capital.

In fiscal 2019, cash flows used in investing activities were \$1,233.0 million, representing property, plant and equipment additions of \$56.0 million and \$1,182.2 million used for the Acquisition, net of cash inflows of \$5.2 million from insurance policies and disposition of property. The remainder of the Acquisition was satisfied with the issuance of common stock. In fiscal 2018, cash flows used in investing activities were \$22.8 million, representing \$21.3 million for purchases of property, plant and equipment, net of inflows related to purchases and sales of investments. In fiscal 2017, we used \$19.8 million in investing activities representing \$21.2 million for purchases of property, plant and equipment, net of \$1.2 million in proceeds from sales of property, plant and equipment, and cash inflows from other investing cash activity.

In fiscal 2019, cash flows provided from financing activities were \$894.4 million. During the first quarter of fiscal 2019, we received \$1,043.6 million in debt proceeds, net of \$18.7 million in debt issuance costs and \$2.7 million original discount fees, which was used for the Acquisition. In fiscal 2019, we paid \$105.3 of this debt. In addition, our dividend payments increased \$15.6 million to \$46.3 million.

On the Acquisition Date, we entered into a credit agreement by and among the Company, the lenders party thereto and JPMorgan Chase Bank, N.A., as administrative agent (the "Credit Agreement"), which provides for senior secured financing of up to \$1,265.0 million, consisting of a term loan facility in an aggregate principal amount of \$1,065.0 million (the "Term Loan Facility") and a revolving credit facility in an aggregate principal amount of up to \$200.0 million, including a letter of credit sub-facility of up to \$50.0 million (the "Revolving Credit Facility"). The Term Loan Facility and the Revolving Credit Facility are referred to as the "Credit Facilities." The Company may generally prepay outstanding loans under the Credit Facilities at any time, without prepayment premium or penalty, subject to customary "breakage" costs with respect to LIBOR rate loans. We made a total prepayment of \$100.0 million during fiscal 2019. The Revolving Credit Facility requires that the Company maintain a maximum first lien secured net leverage ratio, as defined in the Credit Agreement, of 4.00 to 1.00 as of the last day of each fiscal quarter if any revolving loans are outstanding, commencing with the first full fiscal quarter after the Acquisition Date. Additionally, the Credit Agreement contains certain affirmative and negative covenants that limit the ability of the Company, among other things and subject to certain significant exceptions, to incur debt or liens, make investments, enter into certain mergers, consolidations, asset sales and acquisitions, pay dividends and make other restricted payments and enter into transactions with affiliates. The Credit Agreement also contains customary affirmative covenants and events of default. We believe we are in compliance with these covenants. In the second quarter of fiscal 2019, we entered into a floating-to-fixed interest rate swap agreement to hedge the variability in our LIBOR-based interest payments on approximately 70% of our Team Loan balance. See Note 13 of "Notes to the Consolidated Financial Statements" included in Item 8 of Part II of this Annual Report on Form 10-K for additional information regarding the Credit Agreement.

In January 2016, our Board of Directors authorized an increase in the amount available under our share repurchase program from the previously remaining \$75.0 million to \$150.0 million. As of September 30, 2019, \$71.3 million remains available under our share repurchase program. Share repurchases are made from time to time, depending on market and other conditions. The timing, manner, price and amounts of repurchases are determined at the Company's discretion, and the share repurchase program may be suspended, terminated or modified at any time for any reason. The repurchase program does not obligate the Company to acquire any specific number of shares. To date, we have funded share purchases under our share repurchase program from our available cash balance, and anticipate we will continue to do so. Periodically, we have entered into "10b5-1" stock purchase plan agreements with independent brokers to repurchase shares of our common stock in accordance with guidelines pursuant to Rule 10b5-1 of the Securities Exchange Act of 1934, as amended. A plan under Rule 10b5-1 allows a company to repurchase its shares at times when it otherwise might be prevented from doing so under insider trading laws or because of self-imposed trading blackout periods. Repurchases are subject to SEC regulations as well as certain conditions specified in the plan.

Our Board of Directors authorized the initiation of our regular quarterly cash dividend program in January 2016, and since that time has increased the dividend twice, to its current level of \$0.42 per share. The declaration and payment of future dividends is subject to the discretion and determination of the Board of Directors and management, based on a variety of factors, and the program may be suspended, terminated or modified at any time for any reason.

As of September 30, 2019, we had \$188.5 million of cash and cash equivalents, \$124.3 million of which was held in foreign subsidiaries. See Part I, Item 1A entitled "Risk Factors" in this Annual Report on Form 10-K for additional discussion of our foreign operations.

We believe that our current balance of cash, cash generated by our operations, cash repatriation to the United States, and available borrowing capacity under our Credit Facilities will be sufficient to fund our operations, expected capital expenditures, dividend payments, and share repurchases for at least the next twelve months. However, in pursuit of corporate development or other initiatives, we may need to raise additional funds in the future through equity or debt financing, or other arrangements. Depending on future conditions in the capital and credit markets, we could encounter difficulty securing additional financing in the type or amount necessary to pursue these objectives.

OFF-BALANCE SHEET ARRANGEMENTS

At September 30, 2019 and September 30, 2018, we did not have any unconsolidated entities or financial partnerships, such as entities often referred to as structured finance or special purpose entities, which might have been established for the purpose of facilitating off-balance sheet arrangements.

TABULAR DISCLOSURE OF CONTRACTUAL OBLIGATIONS

The following summarizes our contractual obligations at September 30, 2019, and the effect such obligations are expected to have on our liquidity and cash flow in future periods.

CONTRACTUAL OBLIGATIONS (In millions)	Total	Less Than 1 Year	1-3 Years	3-5 Years	After 5 Years
Debt	959.7	13.3	21.3	21.3	903.8
Interest expense and fees	229.7	48.9	71.6	68.7	40.5
Purchase obligations	61.1	58.7	2.4	—	—
Operating leases	36.0	7.0	9.2	7.8	12.0
Severance agreements	3.2	3.1	0.1	—	—
Other long-term liabilities *	27.5	—	13.6	0.5	13.4
Total contractual obligations	<u>\$ 1,317.2</u>	<u>\$ 131.0</u>	<u>\$ 118.2</u>	<u>\$ 98.3</u>	<u>\$ 969.7</u>

* We have excluded \$122.0 million in deferred tax liabilities and \$12.1 million of liabilities for uncertain tax positions from the other long-term liability amounts presented, as the amounts and timing of payments to be settled in cash are not known. We have also excluded \$18.8 million related to the fair value of our interest rate swap and \$0.8 million in deferred rent as the rent payments are included in the table above under the caption "Operating leases."

INTEREST AND FEES ON LONG-TERM DEBT

Interest payments on long-term debt reflect interest rates in effect at September 30, 2019. The interest payments reflect LIBOR rates currently in effect on \$260.7 million of our outstanding debt, and reflect fixed interest rates on \$699 million of outstanding debt for which we have executed interest rate swaps. Commitment fees are based on our estimated consolidated leverage ratio in future periods. See Note 13 of "Notes to the Consolidated Financial Statements" included in Item 8 of Part II of this Annual Report on Form 10-K for additional information regarding our long-term debt.

PURCHASE OBLIGATIONS

We have been operating under a multi-year supply agreement with Cabot Corporation, which has not been a related party since 2002, for the purchase of a particular abrasive particle, the current term of which runs through December 31, 2019. Purchase obligations include an aggregate amount of \$5.9 million of contractual commitments related to this agreement. In addition, we have purchase commitment of \$9.7 million to purchase non-water-based carrier fluid, and have another purchase contract to purchase \$4.1 million of abrasive particles.

OPERATING LEASES

We lease certain vehicles, warehouse facilities, office space, machinery and equipment under cancelable and noncancelable operating leases, most of which expire within ten years of their respective commencement dates and may be renewed by us.

SEVERANCE AGREEMENTS

Liabilities for severance agreements at September 30, 2019 represent payments to be made to former or to be former employees in accordance with individual agreements.

OTHER LONG-TERM LIABILITIES

Other long-term liabilities at September 30, 2019 primarily consist of \$12.7 million asset retirement obligations and \$8.8 million of liabilities related to our foreign benefit plans in Japan and South Korea.

SUPPLEMENTAL UNAUDITED PRO FORMA CONDENSED COMBINED FINANCIAL INFORMATION

The following Unaudited Pro Forma Condensed Combined Financial Information is presented to illustrate the estimated effects of the Acquisition, which was consummated on November 15, 2018 (the "Acquisition Date"), based on the historical results of operations of Cabot Microelectronics and KMG. See Note 4 of "Notes to the Consolidated Financial Statements" included in Part II, Item 8 of this Annual Report on Form 10-K for additional information on the Acquisition. The following Unaudited Pro Forma Condensed Combined Statements of Income for the twelve months ended September 30, 2019 and September 30, 2018 are based on the historical financial statements of Cabot Microelectronics and KMG after giving effect to the Acquisition, and the assumptions and adjustments described in the accompanying notes to these Unaudited Pro Forma Condensed Combined Statements of Income.

The historical Cabot Microelectronics Consolidated Statements of Income for the twelve months ended September 30, 2019 and September 30, 2018 were derived from the consolidated financial statements included elsewhere in this Annual Report on Form 10-K. The historical KMG Consolidated Statements of Income for the twelve months ended September 30, 2019, as well as the historical KMG Consolidated Statements of Income for the twelve months ended September 30, 2018 include information derived from KMG's books and records. Prior to the Acquisition, KMG was on a July 31st fiscal year end reporting cycle. These pro forma financials include actual KMG's pre-Acquisition results with the months aligned to Cabot Microelectronics' fiscal periods, and therefore, they do not align with consolidated financial statements included in KMG's Quarterly or Annual Reports on Form 10-Q or 10-K.

The Unaudited Pro Forma Condensed Combined Statements of Income are presented as if the Acquisition had been consummated on October 1, 2017, the first business day of our 2018 fiscal year, and combine the historical results of Cabot Microelectronics and KMG, which is consistent with internal management reporting, after primarily giving effect to the following assumptions and adjustments:

- Application of the acquisition method of accounting;
- Elimination of transaction costs incurred in connection with the Acquisition;
- Adjustments to reflect the new financing arrangements entered into and legacy financing arrangements retired in connection with the Acquisition;
- The exchange of 0.2000 share(s) of Cabot Microelectronics common stock for each share of KMG common stock; and
- Conformance of accounting policies.

The Unaudited Pro Forma Condensed Combined Financial Information was prepared using the acquisition method of accounting, which requires, among other things, that assets acquired and liabilities assumed in a business combination be recognized at their fair values as of the completion of the acquisition. We utilized estimated fair values at the Acquisition Date to allocate the total consideration exchanged to the net tangible and intangible assets acquired and liabilities assumed. This allocation was initially completed as of November 15, 2018 and finalized in the fourth quarter of fiscal 2019.

The Unaudited Pro Forma Condensed Combined financial information has been prepared on the basis of SEC Regulation S-X Article 11 and is not necessarily indicative of the results of operations that would have been realized had the transactions been completed as of the dates indicated, nor are they meant to be indicative of our anticipated combined future results. In addition, the accompanying Unaudited Pro Forma Condensed Combined Statements of Income do not reflect any additional anticipated synergies, operating efficiencies, cost savings, or any integration costs that may result from the Acquisition.

The historical consolidated financial information has been adjusted in the accompanying Unaudited Pro Forma Condensed Combined Statements of Income to give effect to unaudited pro forma events that are (1) directly attributable to the transaction, (2) factually supportable and (3) are expected to have a continuing impact on the results of operations of the combined company. As a result, under SEC Regulation S-X Article 11, certain non-recurring expenses such as deal costs and compensation expenses related to severance or accelerated stock compensation and certain non-cash costs related to the fair value step-up of inventory are eliminated from pro forma results in the periods presented. Certain recurring historical KMG expenses related to depreciation, amortization, financing costs and costs of sales have been adjusted as if the Acquisition had occurred on October 1, 2017.

In contrast, under the ASC 805 presentation in Note 4 of "Notes to the Consolidated Financial Statements" included in Part II, Item 8 of this Annual Report on Form 10-K, these expenses are required to be included in prior year pro forma results.

The Unaudited Pro Forma Condensed Combined Financial Information, including the related notes included herein should be read in conjunction with Cabot Microelectronics' Current Report on Form 8-K/A filed on January 30, 2019, as well as the Consolidated Financial Statements included elsewhere in this Annual Report on Form 10-K, and the historical consolidated financial statements and related notes of Cabot Microelectronics and KMG, which are available to the public at the SEC's website at www.sec.gov.

CABOT MICROELECTRONICS CORPORATION
Unaudited Pro Forma Condensed Combined Statements of Income
For the Year Ended September 30, 2019 and 2018
(in thousands, except per share data)

	Year Ended September 30,	
	2019	2018
Revenue	\$ 1,099,674	\$ 1,063,563
Cost of sales	623,303	598,049
Gross profit	476,371	465,514
Operating expenses:		
Research, development and technical	51,707	51,950
Selling, general and administrative expenses	221,758	204,875
Asset impairment charges	51,186	—
Total operating expenses	324,651	256,825
Operating income	151,720	208,689
Interest expense	53,743	51,804
Interest income	2,397	4,493
Other income (expense), net	(4,313)	(1,073)
Income before income taxes	96,061	160,305
Provision for income taxes	26,388	33,925
Net income	\$ 69,673	\$ 126,380
Basic earnings per share	\$ 2.40	\$ 4.40
Weighted average basic shares outstanding	28,979	28,755
Diluted earnings per share	\$ 2.36	\$ 4.29
Weighted average diluted shares outstanding	29,502	29,480

CABOT MICROELECTRONICS CORPORATION
Unaudited Pro Forma Condensed Combined Statement of Income
For the Year Ended September 30, 2019
(in thousands, except per share data)

	Cabot Microelectronics (1)	KMG Chemicals (2)			
	Year Ended September 30, 2019	October 1, 2018 to November 14, 2018	Presentation Reclassification (3)	Pro Forma Adjustments (4)	Pro Forma Combined
Revenue	\$ 1,037,696	\$ 61,978	\$ —	\$ —	\$ 1,099,674
Cost of sales	595,043	36,534	4,741	(13,015)	623,303
Gross profit	442,653	25,444	(4,741)	13,015	476,371
Operating expenses:					
Distribution expenses	—	4,741	(4,741)	—	—
Research, development and technical	51,707	—	—	—	51,707
Selling, general and administrative expenses	213,078	40,504	—	(31,824)	221,758
Amortization of intangibles	—	1,943	—	(1,943)	—
Asset impairment charges	67,372	—	—	(16,186)	51,186
Total operating expenses	332,157	47,188	(4,741)	(49,953)	324,651
Operating income (loss)	110,496	(21,744)	—	62,968	151,720
Interest expense	45,681	8,537	—	(475)	53,743
Interest income	2,346	51	—	—	2,397
Derivative fair value gain	—	567	—	(567)	—
Other income (expense), net	(4,055)	(258)	—	—	(4,313)
Income (loss) before income taxes	63,106	(29,921)	—	62,876	96,061
Provision for income taxes (benefit)	23,891	(3,722)	—	6,219	26,388
Net income (loss)	\$ 39,215	\$ (26,199)	\$ —	\$ 56,657	\$ 69,673
Basic earnings per share	\$ 1.37	\$ —			\$ 2.40
Weighted average basic shares outstanding	28,571	—			28,979
Diluted earnings per share	\$ 1.35	\$ —			\$ 2.36
Weighted average diluted shares outstanding	29,094	—			29,502

¹ Includes heritage Cabot Microelectronics from October 1, 2018 to September 30, 2019 and heritage KMG from November 15, 2018 to September 30, 2019. On November 15, 2018, the Acquisition was completed and actual combined company results are included.

² Heritage KMG results that occurred prior to the Acquisition on November 15, 2018.

³ Represents the reclassification of KMG distribution expenses from Operating expenses to Cost of sales, in order to conform with Cabot Microelectronics' accounting policies.

⁴ Certain pro forma adjustments related to depreciation, amortization, financing costs and Costs of sales have been made for the October 1, 2018 to September 30, 2019 period assuming that the Acquisition occurred on October 1, 2017. Additionally, nonrecurring pro forma adjustments have been made for deal costs, compensation expenses related to severance or accelerated stock compensation, and the fair value step-up of inventory directly attributable throughout the twelve-month period.

CABOT MICROELECTRONICS CORPORATION
Unaudited Pro Forma Condensed Combined Statements of Income
For the Year Ended September 30, 2018
(in thousands, except per share data)

	<u>Cabot Microelectronics</u>	<u>KMG Chemicals (1)</u>			
	<u>Year Ended September 30, 2018</u>	<u>Year Ended September 30, 2018</u>	<u>Presentation Reclassification (2)</u>	<u>Pro Forma Adjustments (3)</u>	<u>Pro Forma Combined</u>
Revenue	\$ 590,123	\$ 473,440	\$ —	\$ —	\$ 1,063,563
Cost of sales	276,018	272,517	35,939	13,575	598,049
Gross profit	314,105	200,923	(35,939)	(13,575)	465,514
Operating expenses:					
Distribution expenses	—	35,939	(35,939)	—	—
Research, development and technical	51,950	—	—	—	51,950
Selling, general and administrative expenses	102,037	62,563	—	40,275	204,875
Amortization of intangibles	—	14,690	—	(14,690)	—
Total operating expenses	153,987	113,192	(35,939)	25,585	256,825
Operating income	160,118	87,731	—	(39,160)	208,689
Interest expense	2,905	18,899	—	30,000	51,804
Interest income	4,409	84	—	—	4,493
Loss on the extinguishment of debt	—	6,858	—	(6,858)	—
Derivative fair value gain	—	5,685	—	(5,685)	—
Other income (expense), net	89	(1,162)	—	—	(1,073)
Income before income taxes	161,711	66,581	—	(67,987)	160,305
Provision for income taxes	51,668	57	—	(17,800)	33,925
Net income	\$ 110,043	\$ 66,524	\$ —	\$ (50,187)	\$ 126,380
Basic earnings per share	\$ 4.31	\$ 4.52			\$ 4.40
Weighted average basic shares outstanding	25,518	14,708			28,755
Diluted earnings per share	\$ 4.19	\$ 4.40			\$ 4.29
Weighted average diluted shares outstanding	26,243	15,111			29,480

¹ Shares outstanding for KMG are calculated from the KMG Annual Report on Form 10-K for the fiscal year ended July 31, 2018. They are intended for illustrative purposes only and do not impact pro forma EPS calculations at right. Twelve months ended September 30, 2018 KMG share calculations were not available.

² Represents the reclassification of KMG distribution expenses from Operating expenses to Cost of sales, in order to conform with Cabot Microelectronics' accounting policies.

³ Pro forma adjustments are related to non-recurring items directly attributable to the transaction as well as recurring differences related to depreciation, amortization, compensation or financing costs that were included as if the companies were combined as of October 1, 2017.

CABOT MICROELECTRONICS CORPORATION
Summary of Pro Forma Adjustments
(in thousands, except per share data)

	Year Ended September 30, 2019	Year Ended September 30, 2018
Impact to Cost of sales:		
Depreciation and amortization, net (a)	\$ 1,855	\$ 13,575
Inventory step-up (b)	(14,870)	—
Impact to Cost of sales	\$ (13,015)	\$ 13,575
Impact to Operating expense:		
Depreciation and amortization, net (a)	30,689	48,806
Asset impairment true up (c)	(16,186)	—
Compensation expense (d)	(38,099)	263
Deal costs (e)	(24,414)	(8,794)
Historical KMG amortization in other operating expenses removal (a)	(1,943)	(14,690)
Impact to Operating expenses	\$ (49,953)	\$ 25,585
Impact to Other income (expense), net:		
Loss on the extinguishment of debt (f)	—	(6,858)
Derivative fair value gain (f)	(567)	5,685
Impact to Other income (expense), net	\$ (567)	\$ (1,173)
Impact to Interest expense:		
Interest expense (g)	(475)	30,000
Impact to Interest expense	\$ (475)	\$ 30,000

Adjustments included in the accompanying Unaudited Pro Forma Condensed Combined Statements of Income are as follows:

- a. Depreciation and amortization expense are adjusted by removing depreciation and amortization associated with heritage KMG assets and assigning a pro forma expense based on the fair value of the assets on the date of the Acquisition. For periods after the date of the Acquisition, there is no pro forma adjustment for Depreciation and actual booked depreciation is reflected on a straight-line basis. Depreciation costs are allocated to Cost of sales and Selling, general and administrative expenses based on historical KMG allocations. Amortization costs are allocated to Cost of sales or Selling, general and administrative expense based on the use of the asset, where applicable.
- b. Cost of sales is impacted by increased inventory balance caused by the non-cash impact of the step up to fair value of the inventory. The incremental costs of sales driven by the inventory step-up during the period have been removed.
- c. During the three months ended September 30, 2019, Asset impairment charges in the amount of \$67.4 million were incurred related to the wood treatment business, which was acquired from KMG. It was determined that the facts and circumstances that triggered the impairment were not known, or could not have been reasonably known, at the time of the transaction. Further, it was determined that the Asset impairment charges were not directly attributable to the Acquisition and therefore, would not be wholly removed for purposes of pro forma reporting. Since the Asset impairment charges taken for September 2019 reported results were based on the Acquisition Date while the pro forma financials are based upon an October 1, 2017 acquisition date, the pro forma adjustment of \$16.2 million to reduce the asset impairment charges to \$51.2 million for pro forma results is required. This adjustment reflects the difference between amortization and depreciation expense recognized post-Acquisition from the earlier pro forma acquisition date vs. the amortization and depreciation expense recognized in reported results from the Acquisition Date. The impairment adjustment is tax effected at 25.3%, which considers the taxing jurisdictions where the impaired assets are held (United States and Mexico) and the period for which the impairment is deemed to have occurred (the three months ended September 30, 2019).

- d. Directly attributable and non-recurring compensation expense related to non-recurring retention expenses and stock award vesting directly attributable to the Acquisition are removed for pro forma purposes. For KMG stock awards that were replaced by Company stock awards in connection with the Acquisition (“Replacement Awards”), the vesting for on-going service expenses are added as a pro forma adjustment.
- e. The elimination of non-recurring deal costs incurred in connection with the Acquisition.
- f. As a result of the Acquisition, there were non-recurring costs incurred by KMG as a result of retiring old debt. The costs associated with retiring the old debt facility and other financial instruments are removed for pro forma purposes. These instruments were retired as a result of the Acquisition and are not included in the pro forma results, which are presented as if the Acquisition had occurred on October 1, 2017.
- g. Changes in Interest expense as a result of financing associated with the Acquisition. The adjustments remove heritage KMG interest costs, including unused revolver fees and adds the costs associated with the new financing facilities as if the Acquisition occurred on October 1, 2017. The calculation of Interest expense considers the changing LIBOR rate and uses monthly period end averages from October 1, 2017 to September 30, 2019.

We calculated the income tax effect of the pro forma adjustments using a 21.4% and 23.4% tax rate, which represent the weighted average statutory tax rate for the years ended September 30, 2019 and September 30, 2018, respectively.

In addition, for the 2018 periods presented, we calculated the unaudited pro forma weighted average number of basic shares outstanding by adding the Cabot Microelectronics weighted average number of basic shares outstanding from the share amounts disclosed in the historical Quarterly and Annual Reports on Form 10-Q and 10-K, respectively, to the amount of shares issued in connection with the Acquisition, as if the shares were held for the entire period.

We calculated the unaudited pro forma weighted average number of diluted shares outstanding by adding the number of shares issued in the Acquisition to the amount disclosed in the historical Cabot Microelectronics Quarterly and Annual Reports on Form 10-Q and 10-K, respectively.

The basic and diluted EPS calculation takes pro forma Net income divided by the applicable number of shares outstanding.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

EFFECT OF CURRENCY EXCHANGE RATES AND EXCHANGE RATE RISK MANAGEMENT

We conduct business operations outside of the United States through our foreign operations. Some of our foreign operations maintain their accounting records in their local currencies. Consequently, period to period comparability of results of operations is affected by fluctuations in exchange rates. The primary currencies to which we have exposure are the Korean won, Japanese yen, the New Taiwan dollar, Euro, British pound, and Singapore dollar. Approximately 22% of our revenue is transacted in currencies other than the U.S. dollar. However, outside of the United States, we also incur expenses that are transacted in currencies other than the U.S. dollar, which mitigates the exposure on the Consolidated Statements of Income. We periodically enter into forward contracts in an effort to manage foreign currency exchange exposure on our Consolidated Balance Sheets. However, we are unlikely to be able to hedge these exposures completely. We do not enter into forward contracts or other derivative instruments for speculative or trading purposes.

Currency fluctuations have not had a material impact on our Consolidated Statements of Income during fiscal years 2019, 2018 and 2017. While fluctuations of the yen and won have not had a significant impact on other comprehensive income on our Consolidated Balance Sheets in fiscal 2018, they did have a significant impact in fiscal years 2019 and 2017. We recorded \$8.5 million in currency translation losses and \$6.7 million in currency translation gains, net of tax, during fiscal years 2019 and 2017, respectively, which was included in other comprehensive income.

MARKET RISK AND SENSITIVITY ANALYSIS RELATED TO FOREIGN EXCHANGE RATE RISK

We have performed a sensitivity analysis assuming a hypothetical 10% additional adverse movement in foreign exchange rates. As of September 30, 2019, the analysis demonstrated that such market movements would not have a material adverse effect on our consolidated financial position, results of operations or cash flows over a one-year period. Actual gains and losses in the future may differ materially from this analysis based on changes in the timing and amount of foreign currency rate movements and our actual exposures.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

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Financial Statement Schedule:

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All other schedules are omitted, because they are not required, are not applicable, or the information is included in the consolidated financial statements and notes thereto.

Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of Cabot Microelectronics Corporation

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of Cabot Microelectronics Corporation and its subsidiaries (the “Company”) as of September 30, 2019 and 2018, and the related consolidated statements of income, comprehensive income, changes in stockholders’ equity and cash flows for each of the three years in the period ended September 30, 2019, including the related notes and financial statement schedule listed in the accompanying index (collectively referred to as the “consolidated financial statements”). We also have audited the Company’s internal control over financial reporting as of September 30, 2019, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of September 30, 2019 and 2018, and the results of its operations and its cash flows for each of the three years in the period ended September 30, 2019, in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of September 30, 2019, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the COSO.

Basis for Opinions

The Company’s management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in Management’s Report on Internal Control over Financial Reporting appearing under Item 9A. Our responsibility is to express opinions on the Company’s consolidated financial statements and on the Company’s internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

As described in Management’s Report on Internal Control over Financial Reporting, management has excluded KMG Chemicals, Inc. (“KMG”) from its assessment of internal control over financial reporting as of September 30, 2019, because it was acquired by the Company in a purchase business combination during fiscal 2019. We have also excluded KMG from our audit of internal control over financial reporting. KMG is a wholly-owned subsidiary whose total assets and total revenues excluded from management’s assessment and our audit of internal control over financial reporting represent 14.0% and 43.5%, respectively, of the related consolidated financial statement amounts as of and for the year ended September 30, 2019.

Definition and Limitations of Internal Control over Financial Reporting

A company’s internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company’s internal control over financial reporting includes those policies and procedures that

(i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Critical Audit Matters

The critical audit matters communicated below are matters arising from the current period audit of the consolidated financial statements that were communicated or required to be communicated to the audit committee and that (i) relate to accounts or disclosures that are material to the consolidated financial statements and (ii) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matters below, providing separate opinions on the critical audit matters or on the accounts or disclosures to which they relate.

Valuation of Acquired Customer Relationships Intangible Assets Related to Flowchem and Electronic Chemicals

As described in Note 4 to the consolidated financial statements, the Company completed the acquisition of KMG for total consideration of \$1,536.5 million in fiscal year 2019, which included \$595.0 million of customer relationships intangible assets being recorded related to Flowchem and Electronic chemicals. The fair value of acquired identifiable intangible assets, including customer relationships, was determined using the income approach on an individual asset basis. The key assumptions used by management in the calculation of the discounted cash flows include projected revenues, operating expenses, discount rates, terminal growth rates, and customer attrition rates.

The principal considerations for our determination that performing procedures relating to the valuation of the acquired customer relationships intangible assets related to Flowchem and Electronic chemicals is a critical audit matter are there was significant judgment by management when determining the fair value estimate of the customer relationships intangible assets acquired. This in turn led to a high degree of auditor judgment, subjectivity, and effort in performing procedures and evaluating audit evidence related to management's significant assumptions, including the projected revenues, operating expenses, discount rates, terminal growth rates, and customer attrition rates. In addition, the audit effort involved the use of professionals with specialized skill and knowledge to assist in performing these procedures and evaluating the audit evidence obtained.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to the acquisition accounting, including controls over management's valuation of the intangible assets and controls over development of the assumptions related to the valuation of these assets, including projected revenues, operating expenses, discount rates, terminal growth rates, and customer attrition rates. These procedures also included, among others, testing management's process for determining the fair value of the customer relationships intangible assets; evaluating the appropriateness of the discounted cash flow model and the reasonableness of significant assumptions, including the projected revenues, operating expenses, discount rates, terminal growth rates, and customer attrition rates; and testing the completeness, accuracy, and relevance of underlying data used in the discounted cash flows. Evaluating the reasonableness of the projected revenues and operating expenses involved considering the past performance of the acquired business, as well as economic and industry forecasts. Professionals with specialized skill and knowledge were used to assist in the evaluation of the discounted cash flow model and certain significant assumptions, including the discount rates, terminal growth rates, and customer attrition rates.

Long-Lived Asset Impairment Assessment - Wood Treatment

As described in Notes 2 and 10 to the consolidated financial statements, in the fourth quarter of the fiscal year ended September 30, 2019, the Company recognized a pre-tax impairment of \$67.4 million in the Performance Materials segment related to certain long-lived assets within the wood treatment reporting unit, which is also an asset group. The carrying value of the long-lived assets after impairment was \$13.9 million. Management assesses the recoverability of the carrying value of its long-lived assets to be held and used whenever events or changes in circumstances indicate that the carrying value may not be recoverable. Management believes events subsequent to the acquisition date of KMG, including management's decision to cease

capital investment in the wood treatment business, and shifting market perceptions of environmental risks and costs, resulted in a triggering event to assess the asset group for impairment. The asset group did not pass the recoverability test and the Company proceeded to measure an impairment. Management estimated the fair value of the asset group and recognized an impairment loss for the amount that fair value exceeded carrying value. Fair value of the asset group was estimated by management using an income approach based on a discounted cash flow model. Management used probability-weighted cash flows, including scenarios for continued operations and potential for a sale of the business. Management's fair-value estimate for the wood treatment asset group included significant judgments and assumptions relating to projected revenues through the expected closure of the existing facilities.

The principal considerations for our determination that performing procedures relating to the long-lived asset impairment assessment of the wood treatment asset group is a critical audit matter are there was significant judgment by management when determining the fair value of the asset group. This in turn led to a high degree of auditor judgment, subjectivity, and effort in performing procedures and evaluating audit evidence related to management's significant assumptions, including projected revenues through the expected closure of the existing facilities. In addition, the audit effort involved the use of professionals with specialized skill and knowledge to assist in performing these procedures and evaluating the audit evidence obtained.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to the valuation of the wood treatment asset group. These procedures also included, among others, testing management's process for determining the fair value of the asset group; evaluating the appropriateness of the discounted cash flow model; testing the completeness, accuracy, and relevance of underlying data used in the discounted cash flow model; and evaluating the reasonableness of significant assumptions used by management, including the projected revenues through the expected closure of the existing facilities. Evaluating the reasonableness of projected revenues through the expected closure of the existing facilities involved considering (i) current and past performance of the asset group, (ii) consistency with external market data and (iii) whether the assumptions were consistent with evidence obtained in other areas of the audit. Professionals with specialized skill and knowledge were used to assist in the evaluation of the discounted cash flow model.

/s/ PricewaterhouseCoopers LLP
Chicago, Illinois
November 27, 2019

We have served as the Company's auditor since 1999.

CABOT MICROELECTRONICS CORPORATION
CONSOLIDATED STATEMENTS OF INCOME
(In thousands, except per share amounts)

	Year Ended September 30,		
	2019	2018	2017
Revenue	\$ 1,037,696	\$ 590,123	\$ 507,179
Cost of sales	595,043	276,018	253,050
Gross profit	442,653	314,105	254,129
Operating expenses:			
Research, development and technical	51,707	51,950	54,798
Selling, general and administrative	213,078	102,037	86,483
Asset impairment charges	67,372	—	860
Total operating expenses	332,157	153,987	142,141
Operating income	110,496	160,118	111,988
Interest expense	45,681	2,905	4,529
Interest income	2,346	4,409	2,351
Other income (expense), net	(4,055)	89	(438)
Income before income taxes	63,106	161,711	109,372
Provision for income taxes	23,891	51,668	22,420
Net income	\$ 39,215	\$ 110,043	\$ 86,952
Basic earnings per share	\$ 1.37	\$ 4.31	\$ 3.47
Weighted-average basic shares outstanding	28,571	25,518	25,015
Diluted earnings per share	\$ 1.35	\$ 4.19	\$ 3.40
Weighted-average diluted shares outstanding	29,094	26,243	25,512

The accompanying notes are an integral part of these consolidated financial statements.

CABOT MICROELECTRONICS CORPORATION
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME (LOSS)
(In thousands, except per share amounts)

	Year Ended September 30,		
	2019	2018	2017
Net income	\$ 39,215	\$ 110,043	\$ 86,952
Other comprehensive income (loss), net of tax:			
Foreign currency translation adjustments	(8,548)	679	(6,746)
Minimum pension liability adjustment	(449)	(26)	276
Net unrealized (loss) gain on cash flow hedges	(18,780)	(63)	863
Other comprehensive income (loss), net of tax	(27,777)	590	(5,607)
Comprehensive income	\$ 11,438	\$ 110,633	\$ 81,345

The accompanying notes are an integral part of these consolidated financial statements.

CABOT MICROELECTRONICS CORPORATION
CONSOLIDATED BALANCE SHEETS
(In thousands, except share and per share amounts)

	September 30,	
	2019	2018
ASSETS		
Current assets:		
Cash and cash equivalents	\$ 188,495	\$ 352,921
Accounts receivable, less allowance for doubtful accounts of \$2,377 at September 30, 2019, and \$1,900 at September 30, 2018	146,113	75,886
Inventories	145,278	71,926
Prepaid expenses and other current assets	28,670	22,048
Total current assets	508,556	522,781
Property, plant and equipment, net	276,818	111,403
Goodwill	710,071	101,083
Other intangible assets, net	754,044	35,202
Deferred income taxes	6,566	5,840
Other long-term assets	5,711	4,664
Total assets	\$ 2,261,766	\$ 780,973
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	\$ 54,529	\$ 18,171
Current portion of long-term debt	13,313	—
Accrued expenses, income taxes payable and other current liabilities	103,618	82,983
Total current liabilities	171,460	101,154
Long-term debt, net of current portion, less prepaid debt issuance cost of \$17,900 at September 30, 2019 and \$0 at September 30, 2018	928,463	—
Deferred income taxes	121,993	81
Other long-term liabilities	59,473	13,046
Total liabilities	1,281,389	114,281
Commitments and contingencies (Note 20)		
Stockholders' equity:		
Common Stock: Authorized: 200,000,000 shares, \$0.001 par value; Issued: 39,592,468 shares at September 30, 2019 and 35,862,465 shares at September 30, 2018	40	36
Capital in excess of par value of common stock	988,980	622,498
Retained earnings	461,501	471,673
Accumulated other comprehensive (loss) income	(23,238)	4,539
Treasury stock at cost, 10,491,252 shares at September 30, 2019 and 10,356,147 shares at September 30, 2018	(446,906)	(432,054)
Total stockholders' equity	980,377	666,692
Total liabilities and stockholders' equity	\$ 2,261,766	\$ 780,973

The accompanying notes are an integral part of these consolidated financial statements.

CABOT MICROELECTRONICS CORPORATION
CONSOLIDATED STATEMENTS OF CASH FLOWS
(In thousands)

	Year Ended September 30,		
	2019	2018	2017
Cash flows from operating activities:			
Net income	\$ 39,215	\$ 110,043	\$ 86,952
Adjustments to reconcile Net income to net cash provided by operating activities:			
Depreciation and amortization	98,592	25,876	25,930
Accretion on ARO - Liabilities	530	—	—
Provision for doubtful accounts	432	185	26
Share-based compensation expense	18,227	18,517	13,004
Deemed repatriation transition tax	—	11,340	—
Deferred income tax expense (benefit)	(27,150)	10,835	392
Non-cash foreign exchange (gain)/loss	839	(873)	435
Loss/(Gain) on disposal of property, plant and equipment	(36)	91	(1,820)
Impairment of assets	67,372	—	860
Realized loss on the sale of available-for-sale securities	—	96	—
Non-cash charge on inventory step up of acquired inventory sold	14,869	—	—
Amortization of debt issuance costs	2,884	—	—
(Gain) on sale of assets	—	(956)	—
Other	(1,362)	1,666	188
Changes in operating assets and liabilities:			
Accounts receivable	(6,156)	(12,068)	(3,986)
Inventories	(20,993)	(442)	(1,220)
Prepaid expenses and other assets	6,830	(5,818)	(1,576)
Accounts payable	1,163	128	892
Accrued expenses, income taxes payable and other liabilities	(20,275)	10,245	21,292
Net cash provided by operating activities	174,981	168,865	141,369
Cash flows from investing activities:			
Additions to property, plant and equipment	(55,972)	(21,308)	(21,174)
Proceeds from the sale of property, plant and equipment	—	—	1,216
Acquisition of business, net of cash acquired	(1,182,187)	—	—
Cash settlement of life insurance policy	3,959	—	—
Proceeds from the sales of assets	1,224	3,027	—
Purchases of available-for-sale securities	—	(209,048)	—
Proceeds from the sale and maturities of investment securities	—	214,460	175
Settlement of net investment hedge	—	(9,882)	—
Net cash used in investing activities	(1,232,976)	(22,751)	(19,783)
Cash flows from financing activities:			
Repayment of long-term debt	(105,326)	(144,375)	(10,938)
Dividends paid	(46,324)	(30,730)	(19,041)
Repurchases of common stock	(14,720)	(44,288)	(14,208)
Net proceeds from issuance of stock	17,210	23,031	30,615
Issuance of long-term debt	1,062,337	—	—
Debt issuance costs	(18,745)	—	—

Principal payments under capital lease obligations	—	(1,200)	—
Tax benefits associated with share-based compensation expense	—	—	6,557
Net cash provided by (used in) financing activities	894,432	(197,562)	(7,015)
Effect of exchange rate changes on cash	(863)	6,479	(4,160)
Increase (decrease) in cash	(164,426)	(44,969)	110,411
Cash and cash equivalents at beginning of year	352,921	397,890	287,479
Cash and cash equivalents at end of year	\$ 188,495	\$ 352,921	\$ 397,890
Supplemental disclosure of cash flow information:			
Cash paid for income taxes (net of refunds received)	35,432	20,345	13,321
Cash paid for interest	39,181	2,464	4,128
Supplemental disclosure of non-cash investing and financing activities:			
Purchases of property, plant and equipment in accrued liabilities and accounts payable at the end of period	\$ 8,690	\$ 1,975	\$ 1,488
Equity Consideration related to the Acquisition	\$ 331,048	\$ —	\$ —

The accompanying notes are an integral part of these consolidated financial statements.

CABOT MICROELECTRONICS CORPORATION
CONSOLIDATED STATEMENT OF CHANGES IN STOCKHOLDERS' EQUITY
(In thousands)

	Common Stock	Capital In Excess Of Par	Retained Earnings	Accumulated Other Comprehensive Income	Treasury Stock	Total
Balance at September 30, 2016	\$ 34	\$ 530,840	\$ 330,776	\$ 9,556	\$ (373,558)	\$ 497,648
Share-based compensation expense		13,004				13,004
Repurchases of common stock under share repurchase plans, at cost					(12,035)	(12,035)
Repurchases of common stock - other, at cost					(2,173)	(2,173)
Exercise of stock options	1	27,665				27,666
Issuance of Cabot Microelectronics stock under Employee Stock Purchase Plan		2,986				2,986
Tax benefits from share-based compensation plans		6,443				6,443
Net income			86,952			86,952
Dividends (\$0.78 per share in dollars)			(19,847)			(19,847)
Foreign currency translation adjustment				(6,746)		(6,746)
Interest rate swaps				863		863
Minimum pension liability adjustment				276		276
Balance at September 30, 2017	\$ 35	\$ 580,938	\$ 397,881	\$ 3,949	\$ (387,766)	\$ 595,037
Share-based compensation expense		18,518				18,518
Repurchases of common stock under share repurchase plans, at cost					(40,726)	(40,726)
Repurchases of common stock - other, at cost					(3,562)	(3,562)
Exercise of stock options	1	19,278				19,279
Issuance of Cabot Microelectronics stock under Deposit Share Program		300				300
Issuance of Cabot Microelectronics stock under Employee Stock Purchase Plan		3,464				3,464
Net income			110,043			110,043
Dividends (\$1.40 per share in dollars)			(36,251)			(36,251)
Foreign currency translation adjustment				679		679
Interest rate swaps				(63)		(63)
Minimum pension liability adjustment				(26)		(26)
Balance at September 30, 2018	\$ 36	\$ 622,498	\$ 471,673	\$ 4,539	\$ (432,054)	\$ 666,692
Share-based compensation expense		18,227				18,227
Repurchases of common stock, at cost under share Repurchase Program					(10,002)	(10,002)
Repurchases of common stock - other, at cost					(4,850)	(4,850)
Exercise of stock options	1	13,194				13,195
Issuance of common stock in connection with the Acquisition	3	331,045				331,048
Issuance of Cabot Microelectronics restricted stock under Deposit Share Program		75				75

Issuance of Cabot Microelectronics stock under Employee Stock Purchase Plan		3,941				3,941
Net income			39,215			39,215
Dividends (\$1.66 per share in dollars)			(48,454)			(48,454)
Effect of the adoption of revenue recognition accounting standards			(933)			(933)
Foreign currency translation adjustment				(8,548)		(8,548)
Interest rate swaps				(18,780)		(18,780)
Minimum pension liability adjustment				(449)		(449)
Balance at September 30, 2019	\$	40	\$	988,980	\$	461,501
					\$	(23,238)
					\$	(446,906)
					\$	980,377

The accompanying notes are an integral part of these consolidated financial statements.

CABOT MICROELECTRONICS CORPORATION
NOTES TO THE CONSOLIDATED FINANCIAL STATEMENTS
(In thousands, except share and per share amounts)

1. BACKGROUND AND BASIS OF PRESENTATION

Cabot Microelectronics Corporation (“Cabot Microelectronics”, “the Company”, “us”, “we”, or “our”) is a leading global supplier of consumable materials to semiconductor manufacturers and customers in the pipeline and adjacent industries. On November 15, 2018 (“Acquisition Date”, we completed our acquisition of KMG Chemicals, Inc. (“KMG”, which produces and distributes specialty chemicals and performance materials for the semiconductor industry, pipeline and adjacent industries, and industrial wood preservation industry (“Acquisition”). The Acquisition extended and strengthened our position as one of the leading suppliers of consumable materials to the semiconductor industry and expanded our portfolio with the addition of KMG’s businesses, which we believe enables us to be a leading global provider of performance products and services to pipeline and adjacent industry companies. The Consolidated Financial Statements included in this Annual Report on Form 10-K include the financial results of KMG from the Acquisition Date. Subsequent to the Acquisition, we have operated our business within two reportable segments: Electronic Materials and Performance Materials. The Electronic Materials segment consists of our heritage CMP slurries and polishing pads businesses, as well as the KMG electronic chemicals business. The Performance Materials segment includes KMG’s heritage pipeline performance and wood treatment businesses, and our heritage QED business.

The audited consolidated financial statements have been prepared by us pursuant to the rules of the Securities and Exchange Commission (SEC and accounting principles generally accepted in the United States of America (U.S. GAAP. We operate predominantly in two reportable segments - Electronic Materials and Performance Materials.

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

PRINCIPLES OF CONSOLIDATION

The consolidated financial statements include the accounts of Cabot Microelectronics and its subsidiaries. All intercompany transactions and balances between the companies have been eliminated in the consolidated financial statements as of September 30, 2019.

USE OF ESTIMATES

The preparation of financial statements and related disclosures in conformity with U.S. GAAP requires management to make judgments, assumptions and estimates that affect the amounts reported in the consolidated financial statements and accompanying notes. The accounting estimates that require management's most challenging and subjective judgments include, but are not limited to, those estimates related to impairment of long-lived assets, business combinations, assets retirement obligations, goodwill and other intangible assets, income taxes and contingencies. We base our estimates on historical experience, current conditions and on various other assumptions that we believe are reasonable under the circumstances. However, future events are subject to change and estimates and judgments routinely require adjustment. Actual results may differ from these estimates under different assumptions or conditions.

CASH, CASH EQUIVALENTS AND SHORT-TERM INVESTMENTS

We consider investments in all highly liquid financial instruments with original maturities of three months or less to be cash equivalents. Short-term investments include securities generally having maturities of 90 days to one year. We did not own any securities that were considered short-term investments as of September 30, 2019 or 2018. See Note 5 of this Annual Report on Form 10-K for a more detailed discussion of other financial instruments.

ACCOUNTS RECEIVABLE AND ALLOWANCE FOR DOUBTFUL ACCOUNTS

Trade accounts receivable are recorded at the invoiced amount and do not bear interest. We maintain an allowance for doubtful accounts for estimated losses resulting from the potential inability of our customers to make required payments. Our allowance for doubtful accounts is based on historical collection experience, adjusted for any specific known conditions or circumstances such as customer bankruptcies and increased risk due to economic conditions. Uncollectible account balances are charged against the allowance when we believe that it is probable that the receivable will not be recovered. Amounts charged to bad debt expense are recorded in general and administrative expenses. A portion of our receivables and the related allowance for doubtful accounts is denominated in foreign currencies, so they are subject to foreign exchange fluctuations which are included in the table below under deductions and adjustments.

Our allowance for doubtful accounts changed during the fiscal year ended September 30, 2019 as follows:

Balance as of September 30, 2018	\$	1,900
Amounts charged to expense		432
Deductions and adjustments		45
Balance as of September 30, 2019	\$	<u>2,377</u>

CONCENTRATION OF CREDIT RISK

Financial instruments that subject us to concentrations of credit risk consist principally of accounts receivable. We perform ongoing credit evaluations of our customers' financial conditions and generally do not require collateral to secure accounts receivable. Our exposure to credit risk associated with nonpayment is affected principally by conditions or occurrences within the semiconductor industry and the global economy. We have not experienced significant losses relating to accounts receivable from individual customers or groups of customers.

Customers who represented more than 10% of revenue are as follows:

	Year Ended September 30, 2019		
	2019	2018	2017
Intel	14 %	*	*
Samsung Group (Samsung)	11 %	18 %	16 %
Taiwan Semiconductor Manufacturing Co. (TSMC)	*	12 %	13 %
SK Hynix Inc.	*	10 %	*
Micron Technology Inc.	*	*	10 %

* Not a customer with more than 10% revenue.

Intel accounted for 8.1% and 3.9% of net accounts receivable at September 30, 2019 and 2018, respectively. Samsung accounted for 5.5% and 11.4% of net accounts receivable at September 30, 2019 and 2018, respectively. TSMC accounted for 8.2% and 7.9% of net accounts receivable at September 30, 2019 and 2018, respectively. SK Hynix accounted for 1.6% and 3.4% of net accounts receivable at September 30, 2019 and 2018, respectively. Micron accounted for 6.8% and 13.1% of net accounts receivable at September 30, 2019 and 2018, respectively.

FAIR VALUES OF FINANCIAL INSTRUMENTS

The recorded amounts of cash, accounts receivable, and accounts payable approximate their fair values due to their short-term, highly liquid characteristics. See Note 5 of this Annual Report on Form 10-K for a more detailed discussion of the fair value of financial instruments.

INVENTORIES

Inventories are stated at the lower of cost, determined on the first-in, first-out (FIFO) basis, or net realizable value. Finished goods and work in process inventories include material, labor and manufacturing overhead costs. We regularly review and write down the value of inventory as required for estimated obsolescence or lack of marketability. An inventory reserve is maintained based upon a historical percentage of actual inventories written off and applied against inventory value at the end of the period, adjusted for known conditions and circumstances.

PROPERTY, PLANT AND EQUIPMENT

Property, plant and equipment are recorded at cost. Depreciation is based on the following estimated useful lives of the assets using the straight-line method:

Land Improvements	10-20 years
Buildings	15-30 years
Machinery and equipment	3-20 years
Furniture and fixtures	5-10 years
Vehicles	5-8 years
Information systems	3-5 years
Assets under capital leases	Term of lease or estimated useful life

Expenditures for repairs and maintenance are charged to expense as incurred. Expenditures for major renewals and betterments are capitalized and depreciated over the remaining useful lives. As assets are retired or sold, the related cost and accumulated depreciation are removed from the accounts and any resulting gain or loss is included in the results of operations. We capitalize the costs related to the design and development of software used for internal purposes.

ASSET RETIREMENT OBLIGATIONS

Asset Retirement Obligations (AROs) are the obligation associated with the retirement of tangible long-lived assets. The Company recognizes AROs for the removal or storage of hazardous materials, decontamination or demolition of above ground storage tanks (ASTs), and certain restoration and decommissioning obligations related to certain of our owned and leased properties. The Company recognizes an ARO liability in the period in which it is incurred, including upon Acquisition, if a reasonable estimate of fair value can be made. If a reasonable estimate of fair value cannot be made in the period the ARO is incurred, the liability shall be recognized when a reasonable estimate of fair value can be made. The Company has multiple production facilities with an indeterminate useful life and there is insufficient information available to estimate a range of potential settlement dates for the obligation. Therefore, the Company cannot reasonably estimate the fair value of the liability.

When a reasonable estimate of fair value can be made, an ARO amount is calculated using present value techniques in which estimates of future cash outlays associated with the asset retirements are discounted using a credit-adjusted risk-free rate. Estimates of the timing and amounts of future cash outlays are based on projections of when and how the assets will be retired and the cost of future removal / decommissioning activities. Cost estimates for AROs are based on information using various assumptions related to closure and post-closure costs, timing of future cash outlays, discount rates, and the potential methods for complying with legal and environmental regulations. Material changes to current ARO estimates could result as more information becomes available surrounding these assumption factors.

In subsequent periods, the Company recognizes accretion expense in Cost of sales increasing the ARO balances, such that the balance will ultimately equal the expected cash flows at the time of settlement. See Note 8 of this Annual Report on Form 10-K for the ARO and accretion expense recorded in fiscal 2019.

IMPAIRMENT OF LONG-LIVED ASSETS

We assess the recoverability of the carrying value of long-lived assets to be held and used, whenever events or changes in circumstances indicate that the carrying value may not be recoverable. We must exercise judgment in assessing whether an event of impairment has occurred. For purposes of recognition and measurement of an impairment loss, long-lived assets are either individually identified or grouped with other assets and liabilities at the lowest level for which identifiable cash flows are largely independent of the cash flows of other assets and liabilities. We must exercise judgment in this grouping. The carrying value of a long-lived asset is considered impaired when the total projected undiscounted cash flows from the use and eventual disposition of the asset or asset group are separately identifiable and are less than its carrying value. In that event, a loss is recognized based on the amount by which the carrying value exceeds the fair value of the long-lived asset. The fair value methodology used is an estimate of fair market value, which is made based on prices of similar assets or other valuation methodologies, including present value techniques. Long-lived assets to be disposed of by means other than sale are classified as held for use until their disposal. Long-lived assets to be disposed of by sale are classified as held for sale and are reported at the lower of carrying amount or fair market value, less the estimated cost to sell. Depreciation is discontinued for any long-lived assets classified as held for sale.

In the fourth quarter of fiscal 2019, we recorded an impairment of \$67,372 of long-lived assets, of which \$4,063 related to Property, plant and equipment in the wood treatment asset group. See Note 10 of this Annual Report on Form 10-K for a more detailed discussion of the impairment. We did not record any impairment expense in fiscal 2018. We recorded impairment expense on long-lived assets of \$860 in fiscal 2017 related to surplus research and development equipment, which was subsequently sold for a gain.

GOODWILL AND OTHER INTANGIBLE ASSETS

Purchased intangible assets with finite lives are amortized over their estimated useful lives and are evaluated for impairment using a process similar to that used to evaluate other long-lived assets. Goodwill and indefinite lived intangible assets are not amortized and are tested annually in our fourth fiscal quarter or more frequently if indicators of potential impairment exist, using a fair-value-based approach. The recoverability of goodwill is measured at the reporting unit level, which is defined as either an operating segment or one level below an operating segment. A component is a reporting unit when the component constitutes a business for which discrete financial information is available and segment management regularly reviews the operating results of the component. Components may be combined into one reporting unit when they have similar economic characteristics. We have six reporting units, all of which had goodwill as of September 30, 2019, the date of our annual impairment test.

The Company's Electronic Materials segment is comprised of the three following reporting units: CMP slurries, electronic chemicals, and CMP pads. The Company's Performance Materials segment is comprised of three additional reporting units: pipeline performance, wood treatment, and precision optics.

Accounting guidance provides an entity the option to assess the fair value of a reporting unit either using a qualitative analysis ("step zero") or a quantitative analysis ("step one"). We used a step zero qualitative analysis for the CMP slurries reporting unit in fiscal 2018 and 2019, and for precision optics in fiscal 2019. Aside from those previously noted, all other reporting units were assessed for goodwill impairment using a step one approach. The Flowchem trade name, an indefinite-lived intangible asset, was assessed for impairment using a relief from royalty approach.

Factors requiring significant judgment include the selection of valuation approach and assumptions related to future revenue, discount factors, terminal growth rates, and royalty rates, among others. Changes in economic and operating conditions that occur after the annual impairment analysis or an interim impairment analysis that impact these assumptions may result in future impairment charges.

In the fourth quarter of fiscal 2019, the Company performed its annual goodwill impairment assessment, comparing estimated fair values of the reporting units to their carrying amounts. In estimating the fair values, the Company used the average of an income approach, discounting estimated future cash flows, and a market approach based upon relevant market multiples. As a result of a long-lived asset impairment recorded in the fourth quarter of fiscal 2019, the carrying value of the wood treatment reporting unit is equal to its fair value. In this circumstance with no excess of fair value over carrying value, any unfavorable variances from the estimated inputs used in the impairment assessment may result in further impairment of long-lived assets or goodwill. The Company's Electronic Chemicals reporting unit has goodwill resulting from a recent acquisition, with a greater sensitivity to impairment, due to the extent by which its estimated fair value exceeds its carrying value. Changes to the assumptions requiring significant judgment, noted above, could result in a different outcome for the impairment assessment. Accordingly, the Company performed sensitivity analysis for selected key assumptions.

As a result of the review performed in the fourth quarter of fiscal 2019, and the related sensitivity analysis, we determined that there was no impairment of our goodwill as of September 30, 2019. There was no goodwill impairment recorded in fiscal 2018 or 2017.

While no goodwill impairments were recognized in fiscal 2019, the Company recognized asset impairment charges of \$67,372, of which \$63,309 related to Other intangible assets, net for the wood treatment asset group due to triggering events that occurred in the fourth quarter of fiscal 2019. See Note 10 of this Annual Report on Form 10-K. The Company will continue to monitor the wood treatment asset group for indicators of long-lived asset or goodwill impairment. Absent a sale of the business, as the Company approaches the announced closure date of the facilities and there are fewer estimated future cash flows, there is ongoing potential for further impairments of long-lived assets and impairment of goodwill. While the timing and amounts of any further impairments are unknown, they could be material to the Company's Consolidated Balance Sheets and to the Consolidated Statements of Income, but they will not affect the Company's reported Net cash provided by operating activities.

WARRANTY RESERVE

We maintain a warranty reserve that reflects management's best estimate of the cost to replace product that does not meet our specifications and customers' performance requirements. The warranty reserve is based upon a historical product return rate, adjusted for any specific known conditions or circumstances. Adjustments to the warranty reserve are recorded in Cost of sales.

FOREIGN CURRENCY TRANSLATION

Certain operating activities in Asia and Europe are denominated in local currency, considered to be the functional currency. Assets and liabilities of these operations are translated using exchange rates in effect at the end of the year, and revenue and costs are translated using average exchange rates for the year. The related translation adjustments are reported in comprehensive income in stockholders' equity.

FOREIGN EXCHANGE MANAGEMENT

We transact business in various foreign currencies, primarily the Korean won, Japanese yen, the New Taiwan dollar, Euro, British pound, and Singapore dollar. Our exposure to foreign currency exchange risks has not been significant because a large portion of our business is denominated in United States dollars. However, we also incur expenses in foreign countries that are transacted in currencies other than dollars, which provides natural hedge and mitigates the exposure on our Consolidated Statements of Income. We periodically, enter into certain forward contracts in an effort to manage foreign currency exchange exposure on our Consolidated Balance Sheets. However, we are unlikely to be able to hedge these exposures completely. We do not enter into forward contracts or other derivative instruments for speculative or trading purposes. These foreign exchange contracts do not qualify for hedge accounting; therefore, the gains and losses resulting from the impact of currency exchange rate movements on our forward foreign exchange contracts are recognized as Other income (expense), net in the accompanying Consolidated Statements of Income in the period in which the exchange rates change. See Note 13 of this Annual Report on Form 10-K for a discussion of derivative financial instruments.

PURCHASE COMMITMENTS

We have entered into unconditional purchase obligations, which include noncancelable purchase commitments and take-or-pay arrangements with suppliers. On an ongoing basis, we review our agreements and assess the likelihood of a shortfall in purchases and determine if it is necessary to record a liability. See Note 20 of this Annual Report on Form 10-K for additional discussion of purchase commitments. To date, we have not recorded such a liability.

REVENUE RECOGNITION

Performance Obligations and Material Rights

At contract inception, the Company assesses the goods and services promised in its contracts with customers and identifies a performance obligation for each material promise to the customer. A performance obligation is a promise in a contract to transfer a distinct good or service, or a bundle of goods or services, to the customer, and is the unit of accounting under ASC 606. A contract's transaction price is allocated to each distinct performance obligation and recognized as revenue when, or as, the performance obligation is satisfied. A majority of the Company's contracts have a single performance obligation which represents, in most cases, the products, equipment or services being sold to the customer. Some contracts include multiple performance obligations, including prospective tiered price discounts or delivery of free product that we have concluded represents a material right. Contracts with prospective tiered price discounts require judgment in determining if that discount represents a material right.

Contracts vary in length, and payment terms vary by the type and location of the Company's customers and the products or services offered. However, the period of time between invoicing and when payment is due is typically not significant and has no significant financing components. Customers pay in accordance with negotiated terms upon receipt of goods or completion of services. For these contracts, the transaction price is determined upon establishment of the contract that contains the final terms of the sale, including the description, quantity, and price of goods or services purchased. In certain instances, we receive consideration from a customer prior to transferring goods or services to the customer under the terms of a sales contract. In such cases, we record deferred revenue until the performance obligation is satisfied, which represents a contract liability, and is included in the contract liabilities discussed in Note 3 of this Annual Report on Form 10-K.

The Company recognizes revenue related to product sales at a point in time following the transfer of control of such products to the customer, which generally occurs upon shipment, or delivery depending on the terms of the underlying contracts. The Company considers control to have transferred upon shipment or delivery because the Company has a present right to payment at that time, the customer has legal title to the asset, the Company has transferred physical possession of the asset, and the customer has significant risks and rewards of ownership of the asset. Revenue is recognized on consignment sales when control transfers to the customer, generally at the point of customer usage of the product. The Company also records revenue for services provided to customers in the pipeline and adjacent industries. These services include preventive maintenance, repair and specialized isolation sealing on pipelines and training. Revenue is recorded at a point in time when the services are completed as this is when right to payment and customer acceptance occurs.

For sales contracts that contain multiple performance obligations, the Company allocates the transaction price to each performance obligation identified in the contract based on relative standalone selling prices or estimates of such prices. Standalone selling price, once established, is then used to allocate total consideration proportionally to the various performance obligations within a contract. Most contracts where we have determined there to be multiple performance obligations relate to where we have identified the existence of a material right such that we provide prospective tiered pricing discounts or free product. When we invoice for products shipped under these contracts, we defer the revenue associated with these rights on the balance sheet as a contract liability. Revenue is recognized when the customer exercises the option to purchase goods at a discount in the case of the prospective tiered pricing discounts or when we ship the free product.

Variable Consideration

The primary type of variable consideration present in the Company's contracts are rebates and early payment discounts, both of which are immaterial. Early payment discounts are offered on a limited basis and are not significant. The Company also offers rebates based upon cumulative volume of purchases within a quarter and accrues for the rebate obligation within the quarter that the rebate is earned. ASC 606 did not change the accounting for rebates under ASC 605.

Costs to Obtain and Fulfill a Contract

For certain contracts within the Performance Materials segment, commissions are paid to sales agents based upon a percentage of end-customer invoice value. Agents are paid the commissions after funds are received by the Company from its customers. Under ASC 340, sales commissions are required to be capitalized and expensed over the associated contract period. However, as a practical expedient, the Company does not capitalize commissions as the associated contracts are generally one year or less in duration. For shipping and handling activities performed after a customer obtains control of the goods, the Company has elected to account for these costs as activities to fulfill the promise to transfer the goods and included in Cost of sales.

RESEARCH, DEVELOPMENT AND TECHNICAL

Research, development and technical costs are expensed as incurred and consist primarily of staffing costs, materials and supplies, depreciation, utilities and other facilities costs.

INCOME TAXES

Current income taxes are determined based on estimated taxes payable or refundable on tax returns for the current year. Deferred income taxes are determined using enacted tax rates for the effect of temporary differences between the book and tax bases of recorded assets and liabilities. The effect on deferred tax assets and liabilities of changes in tax rates is recognized in income in the period that includes the enactment date. Provisions are made for both U.S. and any foreign deferred income tax liability or benefit. We assess whether or not our deferred tax assets will ultimately be realized and record an estimated valuation allowance on those deferred tax assets that may not be realized. We recognize the tax benefit of an uncertain tax position only if it is more likely than not that the tax position will be sustained by the taxing authorities, based on the technical merits of the position. In fiscal 2017, we maintained an assertion to permanently reinvest the earnings of all of our foreign subsidiaries. In light of the Tax Act and the associated transition to a modified territorial tax system, we no longer consider our foreign earnings to be indefinitely reinvested. See Note 19 of this Annual Report on Form 10-K for additional information on income taxes.

INTEREST RATE SWAPS

During the second quarter of fiscal 2019, we entered into a floating-to-fixed interest rate swap agreement to hedge the variability in LIBOR-based interest payments on a portion of our outstanding variable rate debt. The fair value of our interest rate swaps is estimated using standard valuation models using market-based observable inputs over the contractual term, including one-month LIBOR-based yield curves, among others. We consider the risk of nonperformance, including counterparty credit risk, in the calculation of the fair value. We have designated these swap agreements as cash flow hedges pursuant to ASC 815, "Derivatives and Hedging". As cash flow hedges, unrealized gains are recognized as assets and unrealized losses are recognized as liabilities. Unrealized gains and losses are designated as effective or ineffective based on a comparison of the changes in fair value of the interest rate swaps and changes in fair value of the underlying exposures being hedged. The effective portion is recorded as a component of accumulated other comprehensive income or loss, while the ineffective portion is recorded as a component of Interest expense. Changes in the method by which we pay interest from one-month LIBOR to another rate of interest could create ineffectiveness in the swaps, and result in amounts being reclassified from other comprehensive income into Net income. Hedge effectiveness is tested quarterly to determine if hedge treatment is appropriate.

SHARE-BASED COMPENSATION

We issue share-based awards under the following programs: our Cabot Microelectronics Corporation 2012 Omnibus Incentive Plan, as amended effective March 7, 2017 (OIP); our Cabot Microelectronics Corporation 2007 Employee Stock Purchase Plan, as Amended and Restated January 1, 2010 (ESPP); and, pursuant to the OIP, our Directors' Deferred Compensation Plan, as amended September 23, 2008 (DDCP), and our 2001 Executive Officer Deposit Share Program (DSP). In March 2017, our stockholders re-approved the material terms of performance-based awards under the OIP for purposes of complying with Section 162(m) of the Internal Revenue Code of 1986, as amended. For additional information regarding these programs, refer to Note 16 of this Annual Report on Form 10-K.

We record share-based compensation expense for all share-based awards, including stock option grants, and restricted stock, restricted stock unit and performance share unit ("PSU") awards, and employee stock purchase plan purchases. We calculate share-based compensation expense using the straight-line approach based on awards ultimately expected to vest, which requires the use of an estimated forfeiture rate. Our estimated forfeiture rate is primarily based on historical experience, but may be revised in future periods if actual forfeitures differ from the estimate. We use the Black-Scholes option-pricing model to estimate the grant date fair value of our stock options and employee stock purchase plan purchases. This model requires the input of highly subjective assumptions, including the price volatility of the underlying stock, the expected term of our stock options, expected dividend yield and the risk-free interest rate. We estimate the expected volatility of our stock options based on a combination of our stock's historical volatility and the implied volatilities from actively-traded options on our stock. We calculate the expected term of our stock options using historical stock option exercise data, and for stock option grants made prior to December 2017, we have added a slight premium to this expected term for employees who meet the definition of retirement-eligible pursuant to their stock option grants during the contractual term of the grant. As of December 2017, the provisions of stock option grants and restricted stock unit awards stated that, except in certain circumstances including termination for cause, once an employee meets the retirement eligibility requirements, any remaining unvested share-based awards will continue to vest regardless of termination of service. Consequently, the requisite service period for the award is satisfied upon retirement eligibility. Therefore, we record the total share-based compensation expense upon award for those employees who have met the retirement eligibility at the grant date. The expected dividend yield represents our annualized dividend in dollars divided by the stock price on the date of grant. The risk-free interest rate is derived from the U.S. Treasury yield curve in effect at the time of grant.

The PSUs that have been awarded may be subject to downward or upward adjustment depending on the total shareholder return achieved by the Company during the particular performance period related to the PSUs, relative to the total shareholder return of an established market index. We use a third-party service provider to estimate the fair value of the PSUs at grant date by using a Monte Carlo simulation model. This model simulates the stock price movements of the Company and Index constituents using certain assumptions, including the stock price of the Company and index constituents, the risk-free interest rate and stock price volatility. Subsequent to the Acquisition, the performance metrics of the PSUs awarded in December 2017 were modified to reflect the performance metrics expected due to the Acquisition.

KMG awards granted subsequent to the entry into the definitive agreement for the Acquisition, but prior to the Acquisition Date, were converted to our restricted stock units ("Replacement Award"), with vesting in three equal installments on the first three anniversaries of the original award date. If the recipient is terminated without cause or resigns with good reason during the 18 months following the Acquisition Date, the Replacement Award will vest as of such termination date in a number of shares equal to 150% of the Replacement Award.

For additional information regarding our share-based compensation plans, refer to Note 16 of this Annual Report on Form 10-K.

EARNINGS PER SHARE

Basic earnings per share (EPS) is calculated by dividing Net income available to common stockholders by the weighted-average number of common shares outstanding during the period, excluding the effects of unvested restricted stock awards with a right to receive non-forfeitable dividends, which are considered participating securities as prescribed by the two-class method under ASC Topic 260, Earnings Per Share (ASC 260). Diluted EPS is calculated in a similar manner, but the weighted-average number of common shares outstanding during the period is increased to include the weighted-average dilutive effect of "in-the-money" stock options and unvested restricted stock shares using the treasury stock method. We adopted ASU 2016-09 in fiscal 2018. Pursuant to the adoption, the proceeds from excess tax benefits are no longer included in the dilutive impact on the weighted average shares outstanding for dilutive EPS. The excess tax benefits were treated as a reduction to tax provision, rather than an increase to equity.

COMPREHENSIVE INCOME

Comprehensive income primarily differs from Net income due to interest rate swap contracts and foreign currency translation adjustments.

EFFECTS OF RECENT ACCOUNTING PRONOUNCEMENTS

In February 2016, the FASB issued ASU No. 2016-02, "Leases" (Topic 842). The provisions of ASU 2016-02 require a dual approach for lessee accounting under which a lessee would recognize a right-of-use asset and a corresponding lease liability. Leases will be classified as either finance or operating leases. For finance leases, a lessee will recognize Interest expense and amortization of the right-of-use asset, and for operating leases, the lessee will recognize a straight-line total lease expense. The guidance also requires specific qualitative and quantitative disclosures to supplement the amounts recorded in the financial statements, to afford better understanding of an entity's leasing activities, including any significant judgments and estimates. The guidance was amended through various ASU's subsequent to ASU 2016-02, all of which will be effective for us beginning October 1, 2019. Additional disclosures for our leases will be required beginning in the first quarter of fiscal 2020.

The Company will elect to use the practical expedients in the standard to not reassess prior conclusions related to contracts containing leases, lease classification and initial direct costs and therefore, does not expect the adoption of Topic 842 to have a significant impact on the Consolidated Statements of Income. We will not elect the hindsight practical expedient. We will also adopt the new standard in our first quarter of fiscal 2020 using the modified retrospective transition method; however, we will be applying the optional transition adjustment that permits us to continue applying Topic 840 within the comparative periods disclosed. By electing this optional transition method, we will recognize a cumulative-effect adjustment to the opening retained earnings balance as of October 1, 2019 rather than the earliest period presented. We also plan to make policy elections not to apply the balance sheet recognition requirements for qualifying short-term leases for non-real estate assets and not to separate non-lease components from lease components, as applicable.

We are finalizing the review of our population of lease contracts, implementing a new third-party lease software system, and establishing internal controls over financial reporting. Our lease portfolio primarily consists of operating leases, and the existing lease contracts include leases related to buildings, land, office equipment, and vehicles. The Company is in the process of determining the impact of adoption of ASU 2016-02 and anticipate the standard to have a material impact to our Consolidated Balance Sheets, but do not anticipate a material impact to our consolidated net earnings or cash flows. The most significant impact will be the recognition of right of use assets and lease liabilities for operating leases to our Consolidated Balance Sheets as of October 1, 2019. The Company will complete its adoption of this standard in the first quarter of fiscal 2020.

In June 2016, the FASB issued ASU No. 2016-13, "Measurement of Credit Losses on Financial Instruments" (Topic 326). The provisions of this standard require financial assets measured at amortized cost to be presented at the net amount expected to be collected. An allowance account would be established to present the net carrying value at the amount expected to be collected. ASU 2016-13 also provides that credit losses relating to available-for-sale debt securities should be recorded through an allowance for credit losses. The guidance was amended through various ASU's subsequent to ASU 2016-13, all of which will be effective for us beginning October 1, 2020, but early adoption is permitted as of October 1, 2019. We are currently evaluating the impact of implementation of this standard on our financial statements.

In March 2017, the FASB issued ASU No. 2017-07 "Improving the Presentation of Net Period Pension Cost and Net Period Postretirement Benefit Cost" (Topic 715). The provisions of ASU 2017-07 provided specific guidance on the presentation of the components of net benefit cost. We adopted this standard ASU 2017-07 effective October 1, 2018 and applied it retrospectively. Pursuant to the adoption, net service costs are recorded as fringe benefit expense under Cost of sales and Operating expenses, and all other costs are recorded in the Other income (expense), net in our Consolidated Statements of Income. The impact of the retrospective adoption in fiscal year 2018 is not material.

In May 2017, the FASB issued ASU No. 2017-09 "Scope of Modification Accounting" (Topic 718). The provisions of ASU 2017-09 provide specific guidance about which changes to the term or conditions of a share-based payment require an entity to apply modification accounting. We adopted ASU 2017-09 effective October 1, 2018 and will apply this new standard to our share-based compensation awards, to the extent modified.

In August 2017, the FASB issued ASU No. 2017-12 "Derivatives and Hedging" (Topic 815). The provisions of this standard amend the hedge accounting model in ASC 815 to expand an entity's ability to hedge nonfinancial and financial risk components, reduce complexity in fair value hedges of interest rate risk, eliminate the requirement to separately measure and report hedge ineffectiveness, and generally require the entire change in the fair value of a hedging instrument to be presented in the same income statement line as the hedged item. The guidance also eases certain documentation and assessment requirements and modifies the accounting for components excluded from the assessment of hedge effectiveness. We early adopted this guidance effective January 1, 2019, and we did not have any hedges that existed as of the initial application date. We applied the new guidance to the interest rate swap that we entered into during our second quarter of fiscal 2019. Pursuant to the guidance, we performed initial quantitative hedge effectiveness testing upon the inception of the hedge, and determined the hedge to be highly effective. Therefore, unrealized changes in fair value are recorded in other comprehensive income. In addition, we reclassify the realized gains and losses out of other comprehensive income, and into Interest expense in our Consolidated Statements of Income, which is the same financial statement line as the hedged item. We will perform subsequent assessments of hedge effectiveness qualitatively on a quarterly basis.

In February 2018, the FASB issued ASU No. 2018-02 "Income Statement – Reporting Comprehensive Income (Topic 220)". The amendments in this standard allow a company to reclassify the stranded tax effects resulting from the Tax Act from accumulated other comprehensive income to retained earnings. ASU 2018-02 will be effective for us beginning October 1, 2019, but early adoption is permitted. We are currently evaluating and quantifying the amount to be reclassified into retained earnings and expect to record the reclassification on October 1, 2019.

In June 2018, the FASB issued ASU No. 2018-07 " Compensation—Stock Compensation (Topic 718): Improvements to Nonemployee Share-Based Payment Accounting." The ASU simplified the accounting for share-based payments granted to nonemployees for goods and services, therefore guidance on such payments to nonemployees would be mostly aligned with the requirements for share-based payments granted to employees. ASU 2018-07 will be effective for us beginning October 1, 2019, but early adoption is permitted (but no earlier than the adoption date of Topic 606). We do not expect implementation of this standard to have material impact on our financial statements.

In August 2018, the FASB issued ASU No. 2018-13 " Fair Value Measurement (Topic 820): Disclosure Framework—Changes to the Disclosure Requirements for Fair Value Measurement." The ASU provides specific guidance on various disclosure requirements in Topic 820, including removal, modification and addition to current disclosure requirements. ASU 2018-13 will be effective for us beginning October 1, 2020, but early adoption is permitted. We are currently evaluating the impact of implementation of this standard on our disclosures.

In August 2018, the FASB issued ASU No. 2018-15 "Intangibles—Goodwill and Other—Internal-Use Software (Subtopic 350-40): Customer's Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement That Is a Service Contract (a consensus of the FASB Emerging Issues Task Force)." The ASU Requires an entity (customer) in a hosting arrangement that is a service contract to follow the guidance in Subtopic 350-40 to determine which implementation costs to capitalize as an asset related to the service contract and which costs to expense. ASU 2018-15 will be effective for us beginning October 1, 2020, but early adoption is permitted. We are currently evaluating the impact of implementation of this standard on our financial statements.

3. REVENUE FROM CONTRACTS WITH CUSTOMERS

Disaggregated Revenue

The Company disaggregates revenue by product area and segment as it best depicts the nature and amount of the Company's revenue. See Note 23 of this Annual Report on Form 10-K for more information.

Contract Balances

The following table provides information about contract liability balances:

	September 30, 2019	October 1, 2018
Contract liabilities (current)	\$ 5,008	\$ 5,310
Contract liabilities (noncurrent)	1,130	1,239

The contract liability balances as of October 1, 2018 in the table above include the amounts recorded upon the adoption of ASC 606. At September 30, 2019, the current portion of contract liabilities of \$5,008 is included in accrued liabilities, taxes payable and other current liabilities, and the noncurrent portion of \$1,130 is included in other long-term liabilities in the Consolidated Balance Sheets. The amount of revenue recognized during the year ended September 30, 2019 that was included in the opening current contract liability balances in our Performance Materials segment was \$4,989. The amount of revenue recognized during the year ended September 30, 2019 that was included in our opening contract liability balances in our Electronic Materials segment was not material.

Transaction Price Allocated to Remaining Performance Obligations

The table below discloses (1) the aggregate amount of the transaction price allocated to performance obligations that are unsatisfied (or partially unsatisfied) as of the end of the reporting period for contracts with an original duration of greater than one year and (2) when the Company expects to recognize this revenue.

	Less Than 1 Year	1-3 Years	3-5 Years	Total
Revenue expected to be recognized on contract liability amounts as of September 30, 2019	\$ 1,344	\$ 671	\$ 460	\$ 2,475

4. BUSINESS COMBINATION

On the Acquisition Date, the Company completed its acquisition of 100% of the outstanding stock of KMG, which was a publicly held company headquartered in Fort Worth, Texas. KMG specialized in producing, processing, and distributing electronic chemicals for the semiconductor industry and performance materials for the pipeline and adjacent industries, and industrial wood preservation industry. We acquired KMG to extend and strengthen our position as one of the leading suppliers of consumable materials to the semiconductor industry and to expand our portfolio with the addition of KMG's performance materials businesses, which we believe enables us to become a leading global provider of performance products and services to the pipeline industry. The purchase consideration was \$1,513,235, including consideration transferred of \$1,536,452, less cash acquired of \$23,217. The consideration was comprised of cash consideration to KMG common shareholders and equity award holders, stock consideration to KMG common shareholders and equity award holders, and cash consideration in the form of the retirement of KMG's preexisting debt obligations. Under the terms of the definitive agreement to acquire KMG, each share of KMG common stock was converted into the right to receive \$55.65 in cash and 0.2000 of a share of Cabot Microelectronics common stock. As a result, we issued 3,237,005 shares of our common stock to KMG's common stockholders, with a stock price of \$102.27 on the Acquisition Date. In connection with the Acquisition, we entered into a credit agreement (the "Credit Agreement"), which provided us with a seven-year, \$1,065,000 term loan facility (the "Term Loan Facility"), which we drew on the Acquisition Date to fund the Acquisition along with cash on hand, and a five-year, \$200,000 revolving credit facility (the "Revolving Credit Facility"), which has not been drawn. In connection with the borrowing, we incurred \$21,408 in debt issuance costs and original issue discount fees, \$859 of which relates to the Revolving Credit Facility and is recorded as a prepaid asset, and the remaining \$20,549 in debt issuance costs relates to the Term Loan Facility and is presented as a reduction of long-term debt. These debt issuance costs are amortized and recorded in Interest expense in the Consolidated Statements of Income over the life of the Revolving Credit Facility and Term Loan Facility, respectively. See below for a summary of the different components that comprise the total consideration.

	Amount
Total cash consideration paid for KMG outstanding common stock and equity awards	\$ 900,756
Cash provided to payoff KMG debt	304,648
Total cash consideration paid	1,205,404
Fair value of Cabot Microelectronics common stock issued for KMG outstanding common stock and equity awards	331,048
Total consideration transferred	<u>\$ 1,536,452</u>

The following table summarizes the allocation of fair values of assets acquired and liabilities assumed as of the Acquisition Date.

	Amount
Cash	\$ 23,217
Accounts receivable	63,950
Inventories	68,087
Prepaid expenses and other current assets	14,694
Property, plant and equipment	147,170
Intangible assets	844,800
Other long-term assets	5,805
Accounts payable	(28,835)
Accrued expenses and other current liabilities	(44,216)
Deferred income taxes liabilities	(154,449)
Other long-term liabilities*	(15,900)
Total identifiable net assets acquired	924,323
Goodwill	612,129
Total consideration transferred	<u>\$ 1,536,452</u>

*In our fourth fiscal quarter of 2019, as a measurement period adjustment, \$12,145 of asset retirement obligations was included in Other long-term liabilities. See Note 8 of this Annual Report on Form 10-K for additional information.

The Acquisition was accounted for using the acquisition method of accounting. Tangible and identifiable intangible assets acquired and liabilities assumed are recorded at fair value as of the Acquisition Date. These valuations are based on the information currently available, and the expectations and assumptions that have been deemed reasonable by the Company's management.

The fair values of identifiable assets and liabilities acquired were developed with the assistance of a third-party valuation firm. The fair value of acquired property, plant and equipment is primarily valued at its "value-in-use." The fair value of acquired identifiable intangible assets was determined using the "income approach" on an individual asset basis. The key assumptions used in the calculation of the discounted cash flows include projected revenues, operating expenses, discount rates, terminal growth rates, and customer attrition rates. The valuations and the underlying assumptions have been deemed reasonable by the Company's management. There are inherent uncertainties and management judgment required in these determinations.

The following table sets forth the components of identifiable intangible assets acquired and their estimated useful lives as of the Acquisition Date:

	Fair Value	Estimated Useful Life (years)
Customer relationships – Flowchem	\$ 315,000	20
Customer relationships -Electronic chemicals	280,000	19
Customer relationships - all other	109,000	15-16
Technology and know-how	85,500	9-11
Trade name – Flowchem	46,000	Indefinite
Trade name - all other	7,000	1-15
EPA product registration rights	2,300	15
Total intangible assets	<u>\$ 844,800</u>	

Customer relationships represent the estimated fair value of the underlying relationships and agreements with KMG's customers, and are being amortized on an accelerated basis in order for the expense to most accurately match the periods of highest cash flows attributable to the identified relationships. Technology and know-how represent the estimated fair value of KMG's technology, processes and knowledge regarding its product offerings, and are being amortized on a straight-line basis. Trade names represent the estimated fair value of the brand and name recognition associated with the marketing of KMG's product offerings and are being amortized on a straight-line basis, except for the Flowchem trade name, which we believe has an indefinite life. The intangible assets subject to amortization have a weighted average useful life of 17.9 years.

The excess of consideration transferred over the fair value of net assets acquired was recorded as goodwill, and is not deductible for income tax purposes. The goodwill is primarily attributable to anticipated revenue growth from the combined company product portfolio, expected synergies of the combined company, and the assembled workforce of KMG. The allocation of goodwill to each of the Electronic Materials and Performance Materials segments as a result of the Acquisition was \$259,859 and \$352,270, respectively.

For the year ended September 30, 2019, we recorded \$34,709 in Acquisition and integration-related expenses, including transaction costs, stock compensation expense, severance and retention costs. These items are included within Selling, general and administrative in the Consolidated Statements of Income. In the same year ended September 30, 2019, we also recorded a charge of \$14,869 related to the fair value write-up of acquired inventory sold, which is included in Cost of sales in the Consolidated Statements of Income.

KMG's results of operations have been included in our Consolidated Statements of Income and Consolidated Statements of Comprehensive Income (Loss) from the Acquisition Date. Net sales of the acquired KMG businesses since the Acquisition Date through September 30, 2019 were \$450,945. KMG's Net loss since the Acquisition Date was \$38,500, which includes \$22,720 of Acquisition-related costs, \$67,372 of impairment expense and a \$14,869 charge for fair value write-up of inventory sold. Further, additional amortization and depreciation expense associated with recording KMG's net assets at fair value decreased KMG's Net income post-Acquisition.

The following unaudited supplemental pro forma information summarizes the combined results of operations for Cabot Microelectronics and KMG as if the Acquisition had occurred on October 1, 2017.

	Year Ended September 30,	
	2019	2018
Revenues	\$ 1,099,674	\$ 1,063,563
Net income	69,673	50,055
Earnings per share - basic	\$ 2.40	\$ 1.74
Earnings per share - diluted	\$ 2.36	\$ 1.70

The following costs are included in the year ended September 30, 2018:

- Non-recurring transaction costs of \$33,208.
- Non-recurring transaction-related employee costs, such as accelerated stock compensation expense, retention and severance expense of \$38,132.
- Non-recurring charge for fair value write-up of inventory sold of \$14,869.

The historical financial information has been adjusted by applying the Company's accounting policies and giving effect to the pro forma adjustments, which consist of (i) amortization expense associated with identified intangible assets; (ii) depreciation of fixed asset step-up (for pre-Acquisition periods only); (iii) accretion of inventory step-up value; (iv) the elimination of Interest expense on pre-Acquisition KMG debt and replacement of Interest expense related to the Acquisition-related financing; (v) transaction-related costs; (vi) accelerated share-based compensation expense (pre-Acquisition periods only); (vii) retention and severance expense incurred as a direct result of the Acquisition; and (viii) an adjustment to tax-effect the aforementioned unaudited pro forma adjustments using an estimated weighted-average effective income tax rate of each entity and the jurisdictions to which the above adjustments relate. The pro forma consolidated results are not necessarily indicative of what the consolidated results actually would have been had the Acquisition been completed on October 1, 2017. The pro forma consolidated results do not purport to project future results of combined operations, nor do they reflect the expected realization of any revenue or cost synergies associated with the Acquisition.

5. FAIR VALUE OF FINANCIAL INSTRUMENTS

Fair value is defined as the price that would be received from the sale of an asset or paid to transfer a liability (an exit price) in the principal or most advantageous market for the asset or liability in an orderly transaction between market participants on the measurement date. The FASB established a three-level hierarchy for disclosure based on the extent and level of judgment used to estimate fair value. Level 1 inputs consist of valuations based on quoted market prices in active markets for identical assets or liabilities. Level 2 inputs consist of valuations based on quoted prices for similar assets or liabilities, quoted prices for identical assets or liabilities in an inactive market, or other observable inputs. Level 3 inputs consist of valuations based on unobservable inputs that are supported by little or no market activity.

The following table presents financial instruments, other than long-term debt, that we measured at fair value on a recurring basis at September 30, 2019 and 2018. See Note 13 of this Annual Report on Form 10-K for a detailed discussion of our long-term debt. We have classified the following assets and liabilities in accordance with the fair value hierarchy set forth in the applicable standards. In instances where the inputs used to measure the fair value of an asset fall into more than one level of the hierarchy, we have classified them based on the lowest level input that is significant to the determination of the fair value.

September 30, 2019	Level 1	Level 2	Level 3	Total Fair Value
Assets:				
Cash and cash equivalents	\$ 188,495	\$ —	\$ —	\$ 188,495
Other long-term investments	980	—	—	980
Total assets	\$ 189,475	\$ —	\$ —	\$ 189,475
Liabilities:				
Derivative financial instruments	—	24,244	—	24,244
Total liabilities	\$ —	\$ 24,244	\$ —	\$ 24,244
September 30, 2018	Level 1	Level 2	Level 3	Total Fair Value
Assets:				
Cash and cash equivalents	\$ 352,921	\$ —	\$ —	\$ 352,921
Other long-term investments	1,137	—	—	1,137
Total assets	\$ 354,058	\$ —	\$ —	\$ 354,058
Liabilities:				
Derivative financial instruments	—	339	—	339
Total liabilities	\$ —	\$ 339	\$ —	\$ 339

Our cash and cash equivalents consist of various bank accounts used to support our operations and investments in institutional money-market funds that are traded in active markets. We invest only in AAA-rated, prime institutional money market funds, comprised of high quality, short-term fixed income securities. Our other long-term investments represent the fair value of investments under the Cabot Microelectronics Supplemental Employee Retirement Plan (SERP), which is a nonqualified supplemental savings plan. The fair value of the investments is determined through quoted market prices within actively traded markets. Although the investments are allocated to individual participants and investment decisions are made solely by those participants, the SERP is a nonqualified plan. Consequently, the Company owns the assets and the related offsetting liability for disbursement until such time as a participant makes a qualifying withdrawal. The long-term asset was adjusted to \$980 in the fourth quarter of fiscal 2019 to reflect its fair value as of September 30, 2019.

Our derivative financial instruments include foreign exchange contracts and an interest rate swap. During the second quarter of fiscal 2019, we entered into a floating-to-fixed interest rate swap agreement to hedge the variability in LIBOR-based interest payments on a portion of our outstanding variable rate debt. The fair value of our derivative instruments is estimated using standard valuation models and market-based observable inputs over the contractual term, including one-month LIBOR-based yield curves for the interest rate swap, and forward rates and/or the Overnight Index Swap (OIS) curve for forward foreign exchange contracts, among others. We consider the risk of nonperformance, including counterparty credit risk, in the calculation of the fair value of derivative financial instruments. See Note 12 of this Annual Report on Form 10-K for more information on our use of derivative financial instruments.

6. INVENTORIES

Inventories consisted of the following:

	September 30,	
	2019	2018
Raw materials	\$ 60,157	\$ 35,150
Work in process	12,940	8,117
Finished goods	72,181	28,659
Total	<u>\$ 145,278</u>	<u>\$ 71,926</u>

7. PROPERTY, PLANT AND EQUIPMENT

Property, plant and equipment consisted of the following:

	September 30,	
	2019	2018
Land	\$ 36,276	\$ 17,525
Buildings	142,585	103,601
Machinery and equipment	257,706	195,434
Vehicles	13,497	—
Furniture and fixtures	9,615	7,575
Information systems	46,516	34,271
Capital lease	1,200	1,200
Construction in progress	63,636	17,001
Total property, plant and equipment	<u>571,031</u>	<u>376,607</u>
Less: accumulated depreciation	<u>(294,213)</u>	<u>(265,204)</u>
Net property, plant and equipment	<u>\$ 276,818</u>	<u>\$ 111,403</u>

Depreciation expense was \$37,584, \$17,255 and \$17,195 for the years ended September 30, 2019, 2018 and 2017, respectively.

In fiscal 2019, we recorded an impairment of \$4,063 of property, plant and equipment related to the wood treatment asset group, and adjusted the remaining useful lives such that they do not extend beyond the announced plant closures around the end of the calendar 2021. See Note 10 of this Annual Report on Form 10-K for further information. In fiscal 2017, we recorded \$860 in impairment expense related to a surplus research and development asset and we recorded a \$1,820 gain on sale of surplus research and development equipment. We did not record any impairment expense on property, plant and equipment in fiscal 2018.

8. ASSET RETIREMENT OBLIGATIONS

The company has asset retirement obligations (AROs) related to storage or removal of hazardous materials, decontamination or demolition of above ground storage tanks (ASTs) and certain restoration and decommissioning obligations related to certain of its owned and leased properties. We measure AROs based upon the applicable accounting guidance, using certain assumptions including estimates provided in decommissioning and demolition cost studies based on multiple alternative scenarios. These cost studies contain significant estimates and assumptions, and are reviewed by Company Management. If operational or regulatory requirements vary from our estimates, we could incur significant additional charges to income and increase in cash expenditures related to those costs.

The Company has multiple production facilities with an indeterminate useful life and there is insufficient information available to estimate a range of potential settlement dates for the obligation. Therefore, the Company cannot reasonably estimate the fair value of the liability. When a reasonable estimate can be made, an asset retirement obligation will be recorded, and such amounts may be material to the consolidated financial statements in the period in which they are recorded.

The following table provides a rollforward of the AROs reflected in the Company's Consolidated Balance Sheets from October 1, 2018 to September 30, 2019:

	Amount
Beginning Balance at October 1, 2018	\$ —
Addition: Purchase Accounting in connection with the Acquisition	12,145
Reduction: Liabilities Settled	—
Addition: Accretion of discount	530
Ending Balance at September 30, 2019	<u>\$ 12,675</u>

Our AROs are recorded in Other long-term liabilities in the Consolidated Balance Sheets. Accretion is recorded in Cost of sales on the Consolidated Statements of Income. See Note 2 of this Annual Report on Form 10-K for additional information on the Company's accounting policy for AROs.

9. GOODWILL AND OTHER INTANGIBLE ASSETS

Goodwill activity for each of the Company's reportable segments which carry goodwill, Electronic Materials and Performance Materials, for the years ended September 30, 2019 and 2018 is shown below:

	Electronic Materials	Performance Materials	Total
Balance at September 30, 2017	\$ 96,237	\$ 5,695	\$ 101,932
Foreign currency translation impact	(154)	—	(154)
Sale of certain assets	—	(695)	(695)
Balance at September 30, 2018	\$ 96,083	\$ 5,000	\$ 101,083
Foreign currency translation impact	(3,145)	4	(3,141)
Goodwill arising from the Acquisition	259,859	352,270	612,129
Balance at September 30, 2019	\$ 352,797	\$ 357,274	\$ 710,071

The components of other intangible assets are as follows:

	September 30, 2019			September 30, 2018		
	Gross Carrying Amount	Accumulated Amortization	Net	Gross Carrying Amount	Accumulated Amortization	Net
Other intangible assets subject to amortization:						
Product technology, trade secrets and know-how	\$ 123,948	\$ 37,993	\$ 85,955	\$ 48,825	\$ 25,305	\$ 23,520
Acquired patents and licenses	9,023	8,397	626	8,270	8,252	18
Customer relationships, distribution rights and other	684,764	64,471	620,293	28,068	17,574	10,494
Total other intangible assets subject to amortization	817,735	110,861	706,874	85,163	51,131	34,032
Other intangible assets not subject to amortization:						
Other indefinite-lived intangibles*	47,170	—	47,170	1,170	—	1,170
Total other intangible assets not subject to amortization	47,170	—	47,170	1,170	—	1,170
Total other intangible assets	\$ 864,905	\$ 110,861	\$ 754,044	\$ 86,333	\$ 51,131	\$ 35,202

* Other indefinite-lived intangibles not subject to amortization primarily consist of trade names.

Gross Carrying Amount

	Balance at September 30, 2018	Additions due to the Acquisition	Impairment	FX and Other	Balance at September 30, 2019	Accumulated Amortization	Net at September 30, 2019
Other intangible assets subject to amortization:							
Customer relationships, trade names, and distribution rights	\$ 28,068	711,000	(51,969)	\$ (2,335)	\$ 684,764	\$ 64,471	\$ 620,293
Product technology, trade secrets and know-how	48,825	85,500	(9,651)	(726)	123,948	37,993	85,955
Acquired patents and licenses	8,270	2,300	(1,689)	142	9,023	8,397	626
Total other intangible assets subject to amortization	85,163	798,800	(63,309)	(2,919)	817,735	110,861	706,874
Other intangible assets not subject to amortization:							
Other indefinite-lived intangibles*	1,170	46,000	—	—	47,170	—	47,170
Total other intangible assets not subject to amortization	1,170	46,000	—	—	47,170	—	47,170
Total other intangible assets	\$ 86,333	\$ 844,800	\$ (63,309)	\$ (2,919)	\$ 864,905	\$ 110,861	\$ 754,044

As discussed in Note 4 of this Annual Report on Form 10-K, we recorded \$844,800 of intangible assets related to the Acquisition. The allocation of the amount into the various categories of intangible assets, as well as useful lives we have established, are discussed in Note 4 of this Annual Report on Form 10-K

Amortization expense was \$59,931, \$7,495 and \$7,795 for fiscal 2019, 2018 and 2017, respectively. Estimated future amortization expense of intangible assets as of September 30, 2019 for the five succeeding fiscal years is as follows:

Fiscal Year	Estimated Amortization Expense
2020	\$90,811
2021	89,801
2022	82,175
2023	69,538
2024	61,627

Goodwill and indefinite-lived intangible assets are tested for impairment annually in the fourth quarter of our fiscal year or more frequently if indicators of potential impairment exist, using a fair-value-based approach. The recoverability of goodwill is measured at the reporting unit level, which is defined as either an operating segment or one level below an operating segment. An entity has the option to assess the fair value of a reporting unit either using a qualitative analysis ("step zero") or a quantitative analysis ("step one"). Similarly, an entity has the option to use a step zero or a step one approach to determine the recoverability of indefinite-lived intangible assets. In fiscal 2018 and 2019, we chose to use a step one analysis for both goodwill impairment and for indefinite-lived intangible asset impairment, with the exception of our CMP slurries and QED reporting units, for which we chose to use a step zero analysis for fiscal 2019. See Note 2 of this Annual Report on Form 10-K for information regarding our accounting policy.

As discussed further in Note 10 of this Annual Report on Form 10-K, in the fourth quarter of fiscal 2019, asset impairment charges of \$63,309 were recorded related to technology and know-how, customer relationships and EPA product registration rights related to our wood treatment reporting unit. For these intangible assets, the remaining useful lives were limited to the end of the calendar 2021. No impairment charges to goodwill were recognized in any periods presented and no impairment charges for other intangible assets were recorded in fiscal 2018 and 2017.

10. LONG-LIVED ASSET IMPAIRMENT -WOOD TREATMENT

The wood treatment asset group produces pentachlorophenol ("penta"), a chemical pesticide supplied to industrial customers to pressure treat certain wood products, primarily utility poles and crossarms, to extend the useful life of such wood products by protecting against insect damage and related decay. It includes operations in Matamoros, Mexico and Tuscaloosa, Alabama, which form a single asset group as their operations are highly interrelated.

In September 2019, as the Company assessed its capital expenditure priorities for fiscal year 2020 and beyond, the Company made a decision to further focus its future capital investments on high-growth businesses complementary to its core, and to cease future investment in the wood treatment business and to not construct a new production facility to replace operations in Matamoros and Tuscaloosa.

The Company is considering various options regarding this business, which may include continued operations of the business until the previously announced closure of the existing facilities by around the end of calendar 2021, or exploration of a possible sale of the business; however, management has not committed to a plan of sale.

Management believes events subsequent to the Acquisition Date, including management's decision to cease capital investment in the wood treatment business, and shifting market perceptions of environmental risks and costs, with the Tuscaloosa warehouse facility fire incident as illustrative, resulted in a triggering event to assess the asset group for impairment. The asset group did not pass the recoverability test and the Company proceeded to measure an impairment.

In the fourth quarter of fiscal 2019, the Company recognized pre-tax asset impairment charges of \$67,372, which were recorded within Asset impairment charges and a tax benefit of \$17,072 in Provision for income taxes in the Consolidated Statements of Income. The impairment is recognized in the Performance Materials segment and relates to long-lived assets in the wood treatment reporting unit.

The long-lived asset impairment was allocated as follows:

	September 30, 2019		
	Balance Prior to Impairment	Impairment	Balance after Impairment
Property, plant, and equipment, net	\$ 4,902	\$ 4,063	\$ 839
Other intangible assets – Product technology	11,646	9,651	1,995
Other intangible assets – Acquired patents and licenses	2,038	1,689	349
Other intangible assets – Customer relationships, distribution rights, and other	62,708	51,969	10,739
Total	\$ 81,294	\$ 67,372	\$ 13,922

To determine the measurement of the impairment loss, the Company estimated the fair value of the asset group, which is also a reporting unit and therefore included goodwill, and recognized an impairment to the extent that the carrying value exceeded the fair value. In estimating the fair value of the wood treatment asset group, the Company used an income approach based upon an estimate of discounted future cash flows, using a probability-weighted approach, including scenarios for continued operations and the potential for a sale of the business. The scenarios for estimating cash flows resulting from continued operations reflected management's best estimates of sales volumes, which may include customer attrition driven by the Company's announcement to cease investment in the wood treatment business, potentially prompting them to switch to alternative products. The sale case is based upon estimated proceeds from a potential sale of the wood treatment business; however, there is no assurance the Company will pursue or consummate a sale. The fair-value estimate for the wood treatment asset group included significant judgments and assumptions relating to projected revenues through the expected closure of the existing facilities.

The fair value of the wood treatment asset group was sufficient that the recognized impairment was limited to long-lived assets and the reporting unit goodwill was not impaired. The Company will continue to monitor the wood treatment asset group for indicators of long-lived asset or goodwill impairment. Absent a sale of the business, as the Company approaches the announced closure date of the facilities and there are fewer estimated future cash flows, there is ongoing potential for further impairments of long-lived assets and impairment of goodwill. While the timing and amounts of any further impairments are unknown, they could be material to the Company's Consolidated Balance Sheets and to the Consolidated Statements of Income, but they will not affect the Company's reported Net cash provided by operating activities. Following the impairment, the wood treatment reporting unit has goodwill of \$35,844 and long-lived assets of \$13,922.

11. OTHER LONG-TERM ASSETS

Other long-term assets consisted of the following:

	September 30,	
	2019	2018
Long-term contract asset	\$ 1,164	\$ 1,548
Long-term SERP Investment	980	1,137
Prepaid unamortized debt issuance cost - revolver	709	—
Other long-term assets	2,858	1,979
Total	\$ 5,711	\$ 4,664

12. ACCRUED EXPENSES, INCOME TAXES PAYABLE AND OTHER CURRENT LIABILITIES

Accrued expenses, income taxes payable and other current liabilities consisted of the following:

	September 30,	
	2019	2018
Accrued compensation	\$ 33,809	\$ 35,367
Income taxes payable	15,725	18,045
Dividends payable	12,953	10,822
KMG - Bernuth warehouse fire related (See Note 20)	7,998	—
Taxes, other than income taxes	6,281	1,976
Interest rate swap liability	5,351	—
Deferred revenue and customer advances	5,008	4,894
Accrued Interest	3,739	—
Goods and services received, not yet invoiced	3,075	1,954
Other	9,679	9,925
Total	\$ 103,618	\$ 82,983

13. DEBT

On the Acquisition Date, we entered into the Credit Agreement by and among the Company, the lenders party thereto and JPMorgan Chase Bank, N.A., as administrative agent, which provides for senior secured financing of up to \$1,265.0 million, consisting of the Term Loan Facility in an aggregate principal amount of \$1,065.0 million and the Revolving Credit Facility in an aggregate principal amount of up to \$200.0 million, including a letter of credit sub-facility of up to \$50.0 million. The Term Loan Facility and the Revolving Credit Facility are referred to as the “Credit Facilities.”

Proceeds of the loans borrowed under the Term Loan Facility on the Acquisition Date were used to fund, in part, the Acquisition and certain of KMG’s existing indebtedness, and to pay related fees and expenses. The Revolving Credit Facility remains undrawn.

The Credit Facilities are guaranteed by each of the Company’s wholly-owned domestic subsidiaries, including KMG and its subsidiaries, and are secured by substantially all assets of the Company and of each subsidiary guarantor, in each case subject to certain exceptions.

Borrowings under the Credit Facilities bear interest at a rate per annum equal to, at the Company’s option, either (a) a LIBOR, subject to a 0.00% floor, or (b) a base rate, in each case plus an applicable margin of, in the case of borrowings under the Term Loan Facility, 2.25% for LIBOR loans and 1.25% for base rate loans and, in the case of borrowings under the Revolving Credit Facility, initially, 1.50% for LIBOR loans and 0.50% for base rate loans. The applicable margin for borrowings under the Revolving Credit Facility varies depending on the Company’s first lien secured net leverage ratio. The Company is also required to pay a commitment fee currently equal to 0.25% per annum to the lenders under the Revolving Credit Facility in respect of the unutilized commitments thereunder. The commitment fee under the Revolving Credit Facility varies depending on the Company’s first lien secured net leverage ratio.

The Term Loan Facility matures on November 15, 2025, the seven-year anniversary of the Acquisition Date, and amortizes in equal quarterly installments of 0.25% of the initial principal amount, starting with the first full fiscal quarter after the Acquisition Date. The Revolving Facility matures on November 15, 2023, the five-year anniversary of the Acquisition Date. In addition, the Company is required to prepay outstanding loans under the Term Loan Facility, subject to certain exceptions, with up to 50% of the Company’s annual excess cash flow, as defined under the Credit Agreement, and 100% of the net cash proceeds of certain recovery events and non-ordinary course asset sales.

The Company may generally prepay outstanding loans under the Credit Facilities at any time, without prepayment premium or penalty, subject to customary “breakage” costs with respect to LIBOR rate loans. We made a total prepayment of \$100.0 million during the fiscal year ended September 30, 2019, respectively.

The Revolving Credit Facility requires that the Company maintain a maximum first lien secured net leverage ratio, as defined in the Credit Agreement, of 4.00 to 1.00 as of the last day of each fiscal quarter if any revolving loans are outstanding, commencing with the first full fiscal quarter after the Acquisition Date.

The Credit Agreement contains certain affirmative and negative covenants that limit the ability of the Company, among other things and subject to certain significant exceptions, to incur debt or liens, make investments, enter into certain mergers, consolidations, asset sales and acquisitions, pay dividends and make other restricted payments and enter into transactions with affiliates. We believe we are in compliance with these covenants.

The Credit Agreement contains certain events of default, including relating to a change of control. If an event of default occurs, the lenders under the Credit Facilities will be entitled to take various actions, including the acceleration of amounts due under the Credit Facilities.

At September 30, 2019, the fair value of the Term Loan Facility, using level 2 inputs, approximated its carrying value of \$959,676 as the loan bears a floating market rate of interest. As of September 30, 2019, \$13,313 of the debt outstanding was classified as short-term, and \$17,900 of debt issuance costs related to our Term Loan were presented as a reduction of long-term debt.

In the second quarter of fiscal 2019, we entered into a floating-to-fixed interest rate swap agreement to hedge the variability in our LIBOR-based interest payments on approximately 70% of our Term Loan Facility balance. See Note 14 of this Annual Report on Form 10-K for additional information.

Principal repayments of the Term Loan Facility are generally made on the last calendar day of each quarter if that day is considered to be a business day.

As of September 30, 2019, scheduled principal repayments of the Term Loan were:

Fiscal Year	Principal Repayments
2020	\$ 13,313
2021	10,650
2022	10,650
2023	10,650
2024	10,650
Thereafter	903,763
	\$ 959,676

14. DERIVATIVE FINANCIAL INSTRUMENTS

We are exposed to various market risks, including risks associated with interest rates and foreign currency exchange rates. We enter into certain derivative transactions to mitigate the volatility associated with these exposures. We have policies in place that define acceptable instrument types we may enter into and we have established controls to limit our market risk exposure. We do not use derivative financial instruments for trading or speculative purposes. In addition, all derivatives, whether designated in hedging relationships or not, are required to be recorded on the Consolidated Balance Sheets at fair value on a gross basis.

Cash Flow Hedges – Interest Rate Swap Agreement

During the second quarter, we entered into a floating-to-fixed interest rate swap agreement to hedge the variability in LIBOR-based interest payments on a portion of our outstanding variable rate debt. As of September 30, 2019, the notional value of the swap was \$699,000 and this value is scheduled to decrease bi-annually, and to expire on January 31, 2024.

We have designated this swap agreement as a cash flow hedge pursuant to ASC 815, "Derivatives and Hedging". Based on certain quantitative and qualitative assessments, we have determined that the hedge is highly effective and qualifies for hedge accounting. Accordingly, unrealized gains and losses on the hedge are recorded in other comprehensive income. Realized gains and losses are recorded on the same financial statement line as the hedged item, which is Interest expense.

Foreign Currency Contracts Not Designated as Hedges

On a regular basis, we enter into forward foreign exchange contracts in an effort to mitigate the risks associated with currency fluctuations on certain foreign currency balance sheet exposures. These foreign exchange contracts do not qualify for hedge accounting; therefore, the gains and losses resulting from the impact of currency exchange rate movements on our forward foreign exchange contracts are recognized as Other income (expense, net in the accompanying Consolidated Statements of Income in the period in which the exchange rates change. As of September 30, 2019 and 2018, the notional amounts of the forward contracts we held to purchase U.S. dollars in exchange for foreign currencies were \$6,239 and \$7,652, respectively, and the notional amounts of forward contracts we held to sell U.S. dollars in exchange for foreign currencies were \$24,270 and \$24,860, respectively.

Net Investment Hedge – Foreign Exchange Contracts

In September 2017, we entered into forward contracts to sell 100 billion Korean won and buy U.S. dollars, which we subsequently terminated in the third quarter of fiscal 2018. We had designated these forward contracts as effective net investment hedges.

The fair value of our derivative instruments included in the Consolidated Balance Sheets, which was determined using level 2 inputs, was as follows:

	<u>Consolidated Balance Sheets Location</u>	<u>Derivative Assets</u>		<u>Derivative Liabilities</u>	
		<u>September 30,</u>		<u>September 30,</u>	
		<u>2019</u>	<u>2018</u>	<u>2019</u>	<u>2018</u>
<u>Derivatives designated as hedging instruments</u>					
Interest rate swap contracts	Accrued expenses, income taxes payable and other current liabilities	\$ —	\$ —	\$ 5,351	\$ —
	Other long-term liabilities	\$ —	\$ —	\$ 18,841	\$ —
<u>Derivatives not designated as hedging instruments</u>					
Foreign exchange contracts	Prepaid expenses and other current assets	\$ —	\$ —	\$ —	\$ —
	Accrued expenses, income taxes payable and other current liabilities	\$ —	\$ —	\$ 52	\$ 339

The following table summarizes the effect of our derivative instrument on our Consolidated Statements of Income for the fiscal years ended September 30, 2019, 2018 and 2017:

	<u>Consolidated Statements of Income Location</u>	<u>Gain (Loss) Recognized in Consolidated Statements of Income</u>		
		<u>Fiscal Year Ended September 30,</u>		
		<u>2019</u>	<u>2018</u>	<u>2017</u>
<u>Derivatives not designated as hedging instruments</u>				
Foreign exchange contracts	Other income (expense), net	\$ 28	\$ (1,569)	\$ (1,462)

The interest rate swap agreement has been deemed to be effective, and realized gains and losses were immaterial to our Consolidated Statements of Income. We recorded an unrealized loss of \$18,780, net of tax, in Accumulated comprehensive income during the twelve months ended September 30, 2019 for this interest rate swap. As of September 30, 2019, during the next 12 months, we expect approximately \$5,351 to be reclassified from Accumulated other comprehensive (loss) income into Interest expense related to our interest rate swap based on projected rates of the LIBOR forward curve as of September 30, 2019.

15. ACCUMULATED OTHER COMPREHENSIVE INCOME (LOSS)

The table below summarizes the components of Accumulated other comprehensive income (loss) (AOCI), net of Provision for income taxes/(benefit), for the years ended September 30, 2019, 2018, and 2017.

	Foreign Currency Translation	Cash Flow Hedges	Pension and Other Postretirement Liabilities	Total
Balance at September 30, 2016	\$ 11,985	\$ (817)	\$ (1,612)	\$ 9,556
Foreign currency translation adjustment, net of tax of \$(2,321)	(6,746)	—	—	(6,746)
Unrealized gain (loss) on cash flow hedges:				
Change in fair value, net of tax of \$(660)	—	1,161	—	1,161
Reclassification adjustment into earnings, net of tax of \$170	—	(298)	—	(298)
Change in pension and other postretirement, net of tax of \$79	—	—	276	276
Balance at September 30, 2017	5,239	46	(1,336)	3,949
Foreign currency translation adjustment, net of tax of \$(2,409)	679	—	—	679
Unrealized gain (loss) on cash flow hedges:				
Change in fair value, net of tax of \$111	—	319	—	319
Reclassification adjustment into earnings, net of tax of \$(133)	—	(382)	—	(382)
Change in pension and other postretirement, net of tax of \$1	—	—	(26)	(26)
Balance at September 30, 2018	5,918	(17)	(1,362)	4,539
Foreign currency translation adjustment, net of tax of \$591	(8,548)	—	—	(8,548)
Unrealized gain (loss) on cash flow hedges:				
Change in fair value, net of tax of \$(5,297)	—	(18,370)	—	(18,370)
Reclassification adjustment into earnings, net of tax of \$(114)	—	(410)	—	(410)
Change in pension and other postretirement, net of tax of \$(30)	—	—	(449)	(449)
Balance at September 30, 2019	\$ (2,630)	\$ (18,797)	\$ (1,811)	\$ (23,238)

The before tax amount reclassified from OCI to Net income in fiscal 2019, related to our cash flow hedges, was recorded as Interest expense on our Consolidated Statements of Income. Amounts reclassified from OCI to Net income, related to pension liabilities, were not material in fiscal years 2019, 2018 and 2017.

16. SHARE-BASED COMPENSATION PLANS

EQUITY INCENTIVE PLAN AND OMNIBUS INCENTIVE PLAN

In March 2004, our stockholders approved our Second Amended and Restated Cabot Microelectronics Corporation 2000 Equity Incentive Plan (the "EIP"), as amended and restated September 23, 2008. In March 2012, our stockholders approved the Cabot Microelectronics Corporation 2012 Omnibus Incentive Plan (the "OIP"), which is the successor plan to the EIP, and which was amended as of March 2017. All share-based awards have been made from the OIP as of its approval date, and since then the EIP no longer has been available for any awards. The OIP is administered by the Compensation Committee of the Board of Directors and is intended to provide management with the flexibility to attract, retain and reward our employees, directors, consultants and advisors. The OIP allows for the granting of six types of equity incentive awards: stock options, restricted stock, restricted stock units, stock appreciation rights (SARs), performance-based awards and substitute awards. The OIP also provides for cash incentive awards to be made. Substitute awards under the OIP are those awards that, in connection with an acquisition, may be granted to employees, directors, consultants or advisors of the acquired company, in substitution for equity incentives held by them in the seller or the acquired company. For example, in fiscal 2019 in connection with the Acquisition, we awarded a total of 43,443 restricted stock unit awards to certain KMG employees in substitution for certain unvested restricted stock unit awards that KMG had awarded subsequent to the entry into the definitive agreement for the Acquisition, but prior to the Acquisition Date ("Replacement Awards"). Also, in fiscal 2016, related to our acquisition of NexPlanar, we granted incentive stock options (ISOs), as allowed under the OIP, to certain NexPlanar employees in substitution for unvested ISOs they had held in NexPlanar at the time of the closing of the acquisition. As of September 30, 2019, no SARs have been granted to date under either plan. No awards of any type have been granted to date to consultants or advisors under either plan. The OIP authorizes up to 4,977,887 shares of stock to be granted thereunder, including up to 2,074,395 shares of stock in the aggregate of awards other than options or SARs, and up to 2,538,690 incentive stock options. The 4,977,887 shares of stock represents 2,944,803 shares of newly authorized shares and 2,033,084 shares previously available under the EIP. In addition, shares that become available from awards under the EIP and the OIP because of events such as forfeitures, cancellations or expirations will also be available for issuance under the OIP. Shares issued under our share-based compensation plans are issued from new shares rather than from treasury shares.

Non-qualified stock options issued under the OIP, as they were under the EIP, are generally time-based and provide for a ten-year term, with options generally vesting equally over a four-year period, with first vesting on the first anniversary of the award date. Non-qualified stock options granted to non-employee directors on an annual basis vest 100% on the first anniversary of the award date. Under the OIP, as under the EIP, employees may also be granted ISOs to purchase common stock at not less than the fair value on the date of the grant. Prior to fiscal 2016, no ISOs had been granted under either plan. Compensation expense related to our stock option awards was \$4,267, \$6,392 and \$5,500 in fiscal 2019, 2018 and 2017, respectively. For additional information on our accounting for share-based compensation, see Note 2 of this Annual Report on Form 10-K.

Under the OIP, employees and non-employees may be awarded shares of restricted stock or restricted stock units, which generally vest over a four-year period, with first vesting on the anniversary of the grant date. In general, shares of restricted stock and restricted stock units may not be sold, assigned, transferred, pledged, disposed of or otherwise encumbered. Holders of restricted stock, and restricted stock units, if specified in the award agreements, have all the rights of stockholders, including voting and dividend rights, subject to the above restrictions. Holders of restricted stock units awarded as of fiscal 2016 have dividend equivalent rights pursuant to the terms of the OIP and respective award agreements. Restricted shares under the OIP, as under the EIP, also may be purchased and placed "on deposit" by executive officers pursuant to the 2001 Deposit Share Program. Shares purchased under this Deposit Share Program receive a 50% match in restricted shares ("Award Shares"). These Award Shares vest at the end of a three-year period, and are subject to forfeiture upon early withdrawal of the deposit shares. Compensation expense related to our restricted stock and restricted stock unit awards and restricted shares matched at 50% pursuant to the Deposit Share Program for fiscal 2019, 2018 and 2017 was \$11,400, \$9,186 and \$6,730, respectively.

In December 2017, we granted performance share unit ("PSU") awards to certain employees. These PSUs fully vest on the third anniversary of the grant date. Stock-based compensation for the awards is recognized over the requisite service period (three years) beginning on the date of award through the end of the performance period based on the number of PSUs expected to vest under the awards at the end of the performance period. The expected amount of vesting is determined using certain performance measures and is re-evaluated at the end of each fiscal year through the end of the performance period. In addition, the PSUs awarded may be subject to downward or upward adjustment depending on the total shareholder return achieved by the Company during the particular performance period related to the PSUs, relative to the total shareholder return of the S&P SmallCap 600 Index. We used a third-party service provider to estimate the fair value of the PSUs at grant date by using a Monte Carlo simulation model. This model simulates the stock price movements of the Company and Index constituents using certain assumptions, including the stock price of our company and Index constituents, the risk-free interest rate and stock price volatility. We have recorded \$1,279 and \$2,056 compensation expense related to our PSU awards in fiscal 2019 and 2018, respectively.

With respect to the Replacement Awards, which were made in fiscal 2019, they vest in three equal installments on the first three anniversaries of the original award date. If the recipient is terminated without cause or resigns with good reason during the 18 months following the Acquisition Date, the Replacement Award will vest as of such termination date in a number of shares equal to 150% of the Replacement Award.

EMPLOYEE STOCK PURCHASE PLAN

In March 2008, our stockholders approved our 2007 Cabot Microelectronics Employee Stock Purchase Plan (the "ESPP"), which amended the ESPP for the primary purpose of increasing the authorized shares of common stock to be purchased under the ESPP from 475,000 designated shares to 975,000 shares. As of September 30, 2019, a total of 336,684 shares are available for purchase under the ESPP. The ESPP allows all full-time, and certain part-time, employees of our Company and its designated subsidiaries to purchase shares of our common stock through payroll deductions. Employees can elect to have up to 10% of their annual earnings withheld to purchase our stock, subject to a maximum number of shares that a participant may purchase and a maximum dollar expenditure in any six-month offering period, and certain other criteria. The provisions of the ESPP allow shares to be purchased at a price no less than the lower of 85% of the closing price at the beginning or end of each semi-annual stock purchase period. A total of 48,820, 49,896, and 69,751 shares were issued under the ESPP during fiscal 2019, 2018 and 2017, respectively. Compensation expense related to the ESPP was \$1,281, \$885 and \$774 in fiscal 2019, 2018 and 2017, respectively.

ACCOUNTING FOR SHARE-BASED COMPENSATION

The fair value of our share-based awards, as shown below, was estimated using the Black-Scholes model with the following weighted-average assumptions:

	Year Ended September 30,		
	2019	2018	2017
Stock Options			
Weighted-average grant date fair value	\$ 27.34	\$ 26.59	\$ 16.50
Expected term (in years)	6.86	6.68	6.57
Expected volatility	26 %	26 %	27 %
Risk-free rate of return	2.8 %	2.4 %	2.1 %
Dividend yield	1.6 %	1.0 %	1.2 %

	Year Ended September 30,		
	2019	2018	2017
ESPP			
Weighted-average grant date fair value	\$ 25.16	\$ 20.94	\$ 12.49
Expected term (in years)	0.5	0.5	0.5
Expected volatility	34 %	26 %	24 %
Risk-free rate of return	2.3 %	1.5 %	0.6 %
Dividend yield	1.6 %	1.1 %	1.3 %

The Black-Scholes model is primarily used in estimating the fair value of short-lived exchange traded options that have no vesting restrictions and are fully transferable. Because employee stock options and ESPP purchases have certain characteristics that are significantly different from traded options, and because changes in the subjective assumptions can materially affect the estimated value, our use of the Black-Scholes model for estimating the fair value of stock options and ESPP purchases may not provide an accurate measure. Although the value of our stock options and ESPP purchases are determined in accordance with applicable accounting standards using an option-pricing model, those values may not be indicative of the fair values observed in a willing buyer/willing seller market transaction.

The fair value of our restricted stock and restricted stock unit awards represents the closing price of our common stock on the date of award. Share-based compensation expense related to restricted stock and restricted stock unit awards is recorded net of expected forfeitures.

SHARE-BASED COMPENSATION EXPENSE

Total share-based compensation expense for the years ended September 30, 2019, 2018 and 2017, is as follows:

	Year Ended September 30,		
	2019	2018	2017
Consolidated Statements of Income classifications:			
Cost of sales	\$ 2,727	\$ 2,450	\$ 2,229
Research, development and technical	2,150	1,940	1,792
Selling, general and administrative	13,350	14,128	8,983
Tax benefit	(3,767)	(4,306)	(4,339)
Total share-based compensation expense, net of tax	\$ 14,460	\$ 14,212	\$ 8,665

Beginning in December 2017, equity grants included the provisions of stock option grants and restricted stock unit awards such that except in certain circumstances including termination for cause, once an employee meets the retirement eligibility requirements, any remaining unvested share-based awards will continue to vest regardless of termination of service. Consequently, the requisite service period for the award is satisfied upon retirement eligibility. Therefore, for those employees who have met the retirement eligibility at the grant date, we now record the total share-based compensation expense upon award; for those employees who will meet the retirement eligibility during the four-year vesting period, we now record the share-based compensation expense over the period from the grant date through the date of retirement eligibility, rather than over the four-year vesting period stated in the award agreement. Restricted stock units granted to non-employee directors on an annual basis vest 100% on the first anniversary of the award date.

In fiscal 2019, we recorded \$3,253 in share-based compensation expense related to the Replacement Awards, including accelerated vesting, issued in conjunction with the Acquisition. In fiscal 2018, we recorded \$2,602 of share-based compensation expense associated with our executive officer transitions, which is included in the table above as general and administrative expense.

STOCK OPTION ACTIVITY

A summary of stock option activity under the EIP and OIP as of September 30, 2019, and changes during fiscal 2019 are presented below:

	Stock Options	Weighted Average Exercise Price	Weighted Average Remaining Contractual Term (in years)	Aggregate Intrinsic Value (in thousands)
Outstanding at September 30, 2018	1,131,481	\$ 52.68		
Granted	148,027	103.23		
Exercised	(313,246)	42.12		
Forfeited or canceled	(87,238)	67.89		
Outstanding at September 30, 2019	879,024	\$ 63.44	6.6	\$ 68,363
Exercisable at September 30, 2019	492,218	\$ 50.70	5.5	\$ 44,549
Expected to vest at September 30, 2019	386,806	\$ 79.72	8.0	\$ 23,783

The aggregate intrinsic value in the table above represents the total pretax intrinsic value (i.e., for all in-the-money stock options, the difference between our closing stock price per share on the last trading day of fiscal 2019 and the exercise price, multiplied by the number of shares) that would have been received by the option holders had all option holders exercised their options on the last trading day of fiscal 2019. The total intrinsic value of options exercised was \$20,711, \$30,345 and \$25,213 for fiscal 2019, 2018 and 2017, respectively.

The total cash received from options exercised was \$13,193, \$19,247 and \$27,666 for fiscal 2019, 2018 and 2017, respectively. The actual tax benefit realized for the tax deductions from options exercised was \$4,449, \$7,503 and \$8,743 for fiscal 2019, 2018 and 2017, respectively. The total fair value of stock options vested during fiscal years 2019, 2018 and 2017 was \$4,506, \$5,008 and \$5,300, respectively. As of September 30, 2019, there was \$7,442 of total unrecognized share-based compensation expense related to unvested stock options granted under the EIP and OIP. That cost is expected to be recognized over a weighted-average period of 2.1 years.

RESTRICTED STOCK AND RESTRICTED STOCK UNITS

A summary of the status of the restricted stock awards and restricted stock unit awards, including PSUs outstanding that were awarded under the OIP as of September 30, 2019, and changes during fiscal 2019, are presented below:

	Restricted Stock Awards and Units	Weighted Average Grant Date Fair Value
Nonvested at September 30, 2018	328,147	\$ 70.42
Granted *	152,499	99.41
Vested	(156,900)	69.17
Forfeited	(48,513)	69.42
Nonvested at September 30, 2019	<u>275,233</u>	<u>\$ 87.36</u>

* Includes PSUs awarded, which may be subject to downward or upward adjustment depending on the performance measures during the particular performance period pursuant to the PSU award agreement.

The total fair value of restricted stock awards and restricted stock units vested during fiscal years 2019, 2018 and 2017 was \$11,060, \$6,669 and \$6,898, respectively. As of September 30, 2019, there was \$18,824 of total unrecognized share-based compensation expense related to unvested restricted stock awards and restricted stock units, including PSUs, under the OIP. That cost is expected to be recognized over a weighted-average period of 2.2 years.

17. SAVINGS PLAN

Effective in May 2000, we adopted the Cabot Microelectronics Corporation 401(k) Plan the "401(k) Plan", which is a qualified defined contribution plan, covering all eligible heritage Cabot Microelectronics U.S. employees meeting certain minimum age and eligibility requirements, as defined by the 401(k) Plan. Participants may make elective contributions of up to 60% of their eligible compensation. All amounts contributed by participants and earnings on these contributions are fully vested at all times. The 401(k) Plan provides for matching and fixed non-elective contributions by the Company. Under the 401(k) Plan, the Company will match 100% of the first four percent of the participant's eligible compensation and 50% of the next two percent of the participant's eligible compensation that is contributed, subject to limitations required by government regulations. Under the 401(k) Plan, all U.S. employees, even those who do not contribute to the 401(k) Plan, receive a contribution by the Company in an amount equal to four percent of eligible compensation, and thus are participants in the 401(k) Plan. Participants are 100% vested in all Company contributions at all times. The Company's expense for the 401(k) Plan totaled \$6,028, \$5,562 and \$5,256 for the fiscal years ended September 30, 2019, 2018 and 2017, respectively.

KMG has a defined contribution 401(k) plan in which all regular heritage KMG U.S. employees are eligible to participate. KMG makes matching contributions under this plan of up to four percent of a participant's compensation up to the annual regulated maximum amounts. The first 3% of the employee contribution is matched at 100%. The next 2% of the employee contribution is matched at 50%. The KMG expense for the 401(k) Plan totaled \$670 for the fiscal year ended September 30, 2019. KMG's United Kingdom and Singapore subsidiaries make contributions to retirement plans that function as defined contribution retirement plans, and the contributions to those plans were approximately \$1,356 for the fiscal year ended September 30, 2019.

18. STOCKHOLDERS' EQUITY

The following is a summary of our capital stock activity over the past three years:

	Number of Shares	
	Common Stock	Treasury Stock
September 30, 2016	34,261,304	9,744,642
Exercise of stock options	818,640	
Restricted stock under EIP and OIP, net of forfeitures	81,047	
Common stock under ESPP	69,751	
Repurchases of common stock under share repurchase plans		167,809
Repurchases of common stock – other		35,739
September 30, 2017	35,230,742	9,948,190
Exercise of stock options	487,915	
Restricted stock under OIP, net of forfeitures	93,817	
Common stock under ESPP	49,991	
Repurchases of common stock under share repurchase plans		369,791
Repurchases of common stock – other		38,166
September 30, 2018	35,862,465	10,356,147
Shares issued in connection with the Acquisition	3,236,865	
Exercise of stock options	313,246	
Restricted stock under OIP, net of forfeitures	131,072	
Common stock under ESPP	48,820	
Repurchases of common stock under share repurchase plans		88,403
Repurchases of common stock – other		46,702
September 30, 2019	39,592,468	10,491,252

COMMON STOCK

Each share of common stock, including those awarded as restricted stock, but not restricted stock units, entitles the holder to one vote on all matters submitted to a vote of Cabot Microelectronics' stockholders. Common stockholders are entitled to receive ratably the dividends, if any, as may be declared by the Board of Directors. Holders of restricted stock units awarded as of fiscal 2016 are entitled to dividend equivalents, which are paid to the holder upon the vesting of the restricted stock units. The number of authorized shares of common stock is 200,000,000 shares.

SHARE REPURCHASES

In January 2016, our Board of Directors authorized an increase in the amount available under our share repurchase program from \$75,000 to \$150,000. Under this program, we repurchased 88,403 shares for \$10,002 during fiscal 2019, 369,791 shares for \$40,726 during fiscal 2018, and 167,809 shares for \$12,035 during fiscal 2017. As of September 30, 2019, \$71,268 remains available under our share repurchase program. To date, we have funded share repurchases under our share repurchase program from our existing cash balance, and anticipate we will continue to do so. The program, which became effective on the authorization date, may be suspended or terminated at any time, at the Company's discretion. For additional information on share repurchases, see Part II, Item 5, "Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities" and the section titled "Liquidity and Capital Resources" in Part II, Item 7, "Management's Discussion and Analysis of Financial Condition and Results of Operations" of this Annual Report of Form 10-K.

Separate from this share repurchase program, a total of 46,702, 38,166 and 35,739 shares were purchased during fiscal 2019, 2018 and 2017, respectively, pursuant to the terms of our OIP as shares withheld from award recipients to cover payroll taxes on the vesting of shares of restricted stock granted under the OIP.

19. INCOME TAXES

Income before income taxes was as follows:

	Year Ended September 30, 2019		
	2019	2018	2017
Domestic	\$ (45,364)	\$ 46,254	\$ 33,272
Foreign	108,470	115,457	76,100
Total	\$ 63,106	\$ 161,711	\$ 109,372

Taxes on income consisted of the following:

	Year Ended September 30, 2019		
	2019	2018	2017
U.S. federal and state:			
Current	\$ 23,461	\$ 14,698	\$ 8,606
Deferred	(23,182)	10,347	1,550
Total	\$ 279	\$ 25,045	\$ 10,156
Foreign:			
Current	\$ 27,580	\$ 26,135	\$ 13,422
Deferred	(3,968)	488	(1,158)
Total	23,612	26,623	12,264
Total U.S. and foreign	\$ 23,891	\$ 51,668	\$ 22,420

The Provision for income taxes at our effective tax rate differed from the statutory rate as follows:

	Year Ended September 30, 2019		
	2019	2018	2017
Federal statutory rate	21.0 %	24.5 %	35.0 %
U.S. benefits from research and experimentation activities	(2.4)	(0.8)	(1.0)
State taxes, net of federal effect	(4.7)	0.1	0.4
Foreign income at other than U.S. rates	10.3	1.2	(14.7)
Excess compensation	6.4	0.4	0.3
Share-based compensation	(7.2)	(4.3)	0.1
U.S. tax reform	14.1	11.2	0.0
Global Intangible Low Taxed Income	3.1	—	—
Foreign Derived Intangible Income	(3.9)	—	—
Other, net	1.2	(0.3)	0.4
Provision for income taxes	37.9 %	32.0 %	20.5 %

The Tax Act created new rules that allow the Company to make an accounting policy election to treat taxes due on GILTI inclusions in taxable income as either a current period expense or reflect such inclusions related to temporary basis differences in the Company's measurement of deferred taxes. The GILTI provision of the Tax Act became effective for Cabot for the year ended September 30, 2019 and the Company has elected to treat the GILTI inclusion as a current period expense. Additionally, the Tax Act allows a domestic corporation an immediate deduction in U.S. taxable income for a portion of its Foreign Derived Intangible Income (FDII).

The increase in the effective tax rate during fiscal 2019 was primarily due to increased tax expense related to newly issued final regulations related to the Tax Act, which impacted our reserves for uncertain tax positions, and also the unfavorable tax treatment of certain Acquisition-related costs, including compensation deduction limitations, and non-deductibility of certain professional fees. Partially offsetting these adverse items, the Tax Act reduced the corporate income tax rate to 21.0% effective January 1, 2018, resulting in a change in our blended tax rate of 24.5% in fiscal 2018 to 21.0% beginning with our fiscal 2019.

The significant increase in our effective tax rate for fiscal 2018 was primarily driven by the changes introduced by the Tax Act in December 2017, which includes the deemed repatriation tax (transition tax). The Company made the decision to take the dividends received deduction (DRD) on its fiscal 2018 tax return and accordingly reflected a section 245A DRD with respect to the section 78 gross-up in its transition tax calculation. Other factors that impacted the Company's effective tax rate for fiscal 2018 were primarily related to benefits in excess of compensation cost from share-based compensation recorded in the Consolidated Statements of Income (as opposed to equity prior to October 2017) and the absence of benefits of a tax holiday in South Korea that expired as of October 2017.

The accounting guidance regarding uncertainty in income taxes prescribes a threshold for the financial statement recognition and measurement of tax positions taken or expected to be taken on a tax return. Under these standards, we may recognize the tax benefit of an uncertain tax position only if it is more likely than not that the tax position will be sustained by the taxing authorities, based on the technical merits of the position.

The following table presents the changes in the balance of gross unrecognized tax benefits during the last three fiscal years:

Balance September 30, 2016	\$ 2,089
Additions for tax positions relating to the current fiscal year	381
Additions for tax positions relating to prior fiscal years	44
Lapse of statute of limitations	(244)
Balance September 30, 2017	<u>2,270</u>
Additions for tax positions relating to the current fiscal year	263
Additions for tax positions relating to prior fiscal years	116
Lapse of statute of limitations	(1,215)
Balance September 30, 2018	<u>1,434</u>
Additions for tax positions relating to the current fiscal year	271
Additions for tax positions relating to prior fiscal years	9,839
Balance September 30, 2019	<u><u>\$ 11,544</u></u>

The entire balance of unrecognized tax benefits shown above as of September 30, 2019 and 2018, would affect our effective tax rate if recognized. We recognize interest and penalties related to uncertain tax positions as income tax expense in our financial statements. Additions for tax positions relating to prior fiscal years of \$9,839 in fiscal 2019 are mainly due to newly issued regulations to the Tax Act, which impacted the Company's reserves for uncertain tax positions. Interest accrued on our Consolidated Balance Sheets was \$281 and \$69 at September 30, 2019 and 2018, respectively, and any interest and penalties charged to expense in fiscal years 2019, 2018 and 2017 was immaterial.

At September 30, 2019, the tax periods open to examination by the U.S. federal, state and local governments include fiscal years 2015 through 2019, and the tax periods open to examination by foreign jurisdictions include fiscal years 2014 through 2019. We do not anticipate a significant change to the total amount of unrecognized tax benefits within the next 12 months.

Significant components of net deferred tax assets and liabilities were as follows:

	September 30,	
	2019	2018
Deferred tax assets:		
Employee benefits	\$ 5,719	\$ 3,995
Inventory	3,811	3,026
Accrued expenses	4,202	839
Share-based compensation expense	5,215	5,379
Credit and other carryforwards	9,743	6,419
Interest rate swap	5,412	—
Other	1,088	358
Valuation allowance	(2,574)	(133)
Total deferred tax assets	<u>\$ 32,616</u>	<u>\$ 19,883</u>
Deferred tax liabilities:		
Depreciation and amortization	\$ 140,092	\$ 8,007
Withholding on foreign income	6,026	5,209
Other	1,926	908
Total deferred tax liabilities	<u>\$ 148,044</u>	<u>\$ 14,124</u>

As of September 30, 2019, the Company had foreign and domestic net operating loss carryforwards (“NOLs”) of \$13,465, which will expire over the period between fiscal year 2020 and fiscal year 2039. We have recorded a tax-effected valuation allowance of \$2,565 against the deferred tax assets related to certain foreign and U.S. federal and state NOLs, as well as on certain federal tax credit carryforwards. As of September 30, 2019, the Company had a U.S. federal and state tax credit carryforward of \$2,396, which will expire beginning in fiscal years 2021 through 2039.

Prior to enactment of the Tax Act, the Company did not record income tax expense for the undistributed earnings of its international subsidiaries. As a result of the Tax Act, the Company no longer intends to maintain the indefinite reinvestment assertion.

20. COMMITMENTS AND CONTINGENCIES

LEGAL PROCEEDINGS AND OTHER CONTINGENCIES

We periodically become a party to legal proceedings, arbitrations, and regulatory proceedings (“contingencies”) arising in the ordinary course of our business operations. The ultimate resolution of these contingencies is subject to significant uncertainty, and should we fail to prevail in any of them or should several of them be resolved against us in the same reporting period, these matters could, individually or in the aggregate, be material to our consolidated financial statements. One of these contingencies, related to Star Lake Canal, which we assumed in connection with the Acquisition, is discussed below. The ultimate outcome of these matters, however, cannot be determined at this time, nor can the amount of any potential loss be reasonably estimated, and as a result except where indicated no amounts have been recorded in our consolidated financial statements. The Company records legal costs associated with loss contingencies as expenses in the period in which they are incurred.

On May 31, 2019, a fire occurred at the warehouse of the facility of KMG’s subsidiary, KMG-Bernuth, in Tuscaloosa, Alabama, which processes penta for sale to customers in the United States and Canada. The warehouse fire, which we believe originated from non-hazardous waste materials temporarily stored in the warehouse for recycling purposes, caused no injuries and was extinguished in less than an hour. Company personnel investigated the incident, and KMG-Bernuth commenced cleanup with oversight from certain local, state and federal authorities. The carrying value of the warehouse and the affected inventory are not material. Applying the accounting guidance under ASC 410-30, Environmental Obligations and ASC 450, Contingencies, we determined that since we have environmental obligations as of the date of the fire, costs for the fire waste cleanup and disposal should be recognized to the extent they are probable and reasonably estimable. We have applied these criteria and recorded an undiscounted amount of \$9,494 loss contingency regarding disposal costs that can be reasonably estimated at this time. These disposal costs were charged to Cost of sales. There are potential additional disposal and other costs that cannot be reasonably estimated as of this time related to materials in the warehouse or otherwise impacted by the incident. The fire waste cleanup and disposal costs have been and may continue to be significant due to the nature of federally-regulated penta-related waste cleanup and disposal requirements. We will continue to update the estimated losses as new information becomes available.

In addition, we are working with our insurance carriers on possible recovery of losses and costs, but at this point we cannot reasonably estimate whether we will receive, or if so, the amount of, any potential insurance recoveries. As such, no insurance recoveries have been recognized as of September 30, 2019.

Separately, in 2014, prior to the Acquisition, the United States Environmental Protection Agency (“EPA”) had notified KMG-Bernuth, that the EPA considered it to be a potentially responsible party under the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (“CERCLA”) by virtue of its relationship with certain alleged predecessor companies, including Idacon, Inc (f/k/a Sonford Chemical Company) in connection with the Star Lake Canal Superfund Site near Beaumont, Texas. The EPA has estimated that the remediation will cost approximately \$22.0 million. KMG-Bernuth and approximately seven other parties entered into an agreement with the EPA in September 2016 to complete a remedial design phase of the remediation of the site. The remediation work will be performed under a separate future agreement. Although KMG-Bernuth has not conceded liability, a reserve in connection with the remedial design was established, and as of September 30, 2019, the reserve remaining was \$728.

We also may face other governmental or third-party claims, or otherwise incur costs, relating to cleanup of, or for injuries resulting from, contamination at sites associated with this or other past and present operations. We accrue for environmental liabilities when a determination can be made that they are probable and reasonably estimable. Other than as described herein, we are not involved in any legal proceedings that we believe could have a material impact on our consolidated financial position, results of operations or cash flows.

In addition, our Company is subject to extensive federal, state and local laws, regulations and ordinances in the U.S. and in other countries. These regulatory requirements relate to the use, generation, storage, handling, emission, transportation and discharge of certain hazardous materials, substances and waste into the environment. The Company, including its KMG entities, manage Environmental, Health and Safety (“EHS”) matters related to protection of the environment and human health, the cleanup of contaminated sites, the treatment, storage and disposal of wastes, and the emission of substances into the air or waterways, among other EHS concerns. Governmental authorities can enforce compliance with their regulations, and violators may be subject to fines, injunctions or both. The Company devotes significant financial resources to compliance, including costs for ongoing compliance.

Certain licenses, permits and product registrations are required for the Company’s products and operations in the U.S., Mexico and other countries in which it does business. The licenses, permits and product registrations are subject to revocation, modification and renewal by governmental authorities. In the United States in particular, producers and distributors of penta, which is a product manufactured and sold by KMG-Bernuth as part of the wood treatment business, are subject to registration and notification requirements under the Federal Insecticide, Fungicide and Rodenticide Act (“FIFRA”) and comparable state law in order to sell this product in the United States. Compliance with these requirements may have a significant effect on our business, financial condition and results of operations.

We are subject to contingencies, including litigation relating to EHS laws and regulations, commercial disputes and other matters. Certain of these contingencies are discussed above and below. The ultimate resolution of these contingencies is subject to significant uncertainty, and should we fail to prevail in any of them or should several of them be resolved against us in the same reporting period, these matters could, individually or in the aggregate, be material to the consolidated financial statements. The ultimate outcome of these matters cannot be determined at this time, nor can the amount of any potential loss be reasonably estimated, and as a result except where indicated no amounts have been recorded in our consolidated financial statements. The Company records legal costs associated with loss contingencies as expenses in the period in which they are incurred.

INDEMNIFICATION

In the normal course of business, we are a party to a variety of agreements pursuant to which we may be obligated to indemnify the other party with respect to certain matters. Generally, these obligations arise in the context of agreements entered into by us, under which we customarily agree to hold the other party harmless against losses arising from items such as a breach of certain representations and covenants including title to assets sold, certain intellectual property rights and certain environmental matters. These terms are common in the industries in which we conduct business. In each of these circumstances, payment by us is subject to certain monetary and other limitations and is conditioned on the other party making an adverse claim pursuant to the procedures specified in the particular agreement, which typically allow us to challenge the other party's claims.

We evaluate estimated losses for such indemnifications under the accounting standards related to contingencies and guarantees. We consider such factors as the degree of probability of an unfavorable outcome and the ability to make a reasonable estimate of the amount of loss. To date, we have not experienced material costs as a result of such obligations and, as of September 30, 2019, have not recorded any liabilities related to such indemnifications in our financial statements as we do not believe the likelihood of such obligations is probable.

LEASE COMMITMENTS

We lease certain vehicles, warehouse facilities, office space, machinery and equipment under cancelable and noncancelable leases, most of which expire in five years and may be renewed by us. Rent expense under such arrangements during fiscal 2019, 2018 and 2017 totaled \$7,975, \$4,307 and \$3,120, respectively.

Future minimum rental commitments under noncancelable leases as of September 30, 2019 are as follows:

Fiscal Year	Amount
2020	\$ 6,984
2021	4,941
2022	4,291
2023	4,122
2024	3,710
Thereafter	12,010
	<u>\$ 36,058</u>

PURCHASE OBLIGATIONS

Purchase obligations include take-or-pay arrangements with suppliers, and purchase orders and other obligations entered into in the normal course of business regarding the purchase of goods and services. We have been operating under an abrasive particle supply agreement with Cabot Corporation, our former parent company which is not a related party, the current term of which runs through December 2019. As of September 30, 2019, purchase obligations include \$5,897 of contractual commitments related to this agreement. In addition, we have purchase commitment of \$9.7 million to purchase non-water-based carrier fluid, and have another purchase contract to purchase \$4.1 million of abrasive particles.

POSTRETIREMENT OBLIGATIONS IN FOREIGN JURISDICTIONS

We have defined benefit plans covering employees in certain foreign jurisdictions as required by local law. Net service costs are recorded as fringe benefit expense under Cost of sales and Operating expenses, and all other costs are recorded in the Other income (expense), net in our Consolidated Statements of Income.

Our unfunded plans in Japan, which represent the majority of our pension liability for such plans, had projected benefit obligations of \$7,175 and \$6,621 as of September 30, 2019 and 2018, respectively, and an accumulated benefit obligation of \$5,704 and \$5,234 as of September 30, 2019 and 2018, respectively. Key assumptions used in the actuarial measurement of the Japan pension liability include a weighted average discount rate of 0.25% and 0.50% at September 30, 2019 and 2018, respectively, and an expected rate of compensation increase of 2.50% at September 30, 2019 and 2018, respectively. Total future Japan pension costs included in Accumulated other comprehensive (loss) income are \$(1,894) and \$(1,735) at September 30, 2019 and 2018, respectively.

Our unfunded plans in South Korea had projected benefit obligations of \$2,182 and \$1,731 as of September 30, 2019 and 2018 and an accumulated benefit obligation of \$1,264 and \$1,064 as of September 30, 2019 and 2018, respectively. Key assumptions used in the actuarial measurement of the Korea pension liability include weighted average discount rates of 2.50% and 3.75% at September 30, 2019 and 2018, respectively, and an expected rate of compensation increase of 4.50% at September 30, 2019 and 2018. Total future Korea pension costs included in Accumulated other comprehensive (loss) income are \$(457) and \$(133) at September 30, 2019 and 2018, respectively.

Our benefit plan for KMG employees in France had a projected benefit obligation of \$1,764 as of September 30, 2019 and an accumulated benefit obligation of \$1,346 as of September 30, 2019. Key assumptions used in the actuarial measurement of the France pension liability include a weighted average discount rate of 0.50% at September 30, 2019 and an expected rate of compensation increase of 2.50%, and an expected rate of return on plan assets of 2.15% at September 30, 2019. Total future France pension costs included in Accumulated other comprehensive (loss) income is not material at September 30, 2019.

Benefit costs for the combined plans were \$1,345, \$1,236 and \$1,176 in fiscal years 2019, 2018 and 2017, respectively, consisting primarily of service costs, and were recorded as fringe benefit expense under Cost of sales and Operating expenses in our Consolidated Statements of Income. Estimated future benefit payments are as follows:

Fiscal Year	Amount
2020	\$ 662
2021	481
2022	498
2023	621
2024	663
2025 to 2029	4,947

21. EARNINGS PER SHARE

Basic earnings per share (EPS) is calculated by dividing Net income available to common stockholders by the weighted-average number of common shares outstanding during the period, excluding the effects of unvested restricted stock awards with a right to receive non-forfeitable dividends, which are considered participating securities as prescribed by the two-class method under ASC 260 "Earnings per Share". Beginning in the first quarter of fiscal 2019, the amount of participating securities was no longer material and therefore, we have excluded such securities from our calculation of EPS in fiscal 2019. Diluted EPS is calculated in a similar manner, but the weighted-average number of common shares outstanding during the period is increased to include the weighted-average dilutive effect of "in-the-money" stock options and unvested restricted stock shares and units using the treasury stock method.

The standards of accounting for earnings per share require companies to provide a reconciliation of the numerator and denominator of the basic and Diluted earnings per share computations. Basic and Diluted earnings per share were calculated as follows:

	Year Ended September 30,		
	2019	2018	2017
Numerator:			
Net income	\$ 39,215	\$ 110,043	\$ 86,952
Less: income attributable to participating securities	—	(123)	(256)
Net income available to common stockholders	<u>\$ 39,215</u>	<u>\$ 109,920</u>	<u>\$ 86,696</u>
Denominator:			
Weighted-average common shares (Denominator for basic calculation)	28,571,052	25,517,825	25,015,458
Weighted-average effect of dilutive securities:			
Share-based compensation	522,975	725,339	497,029
Diluted weighted-average common shares (Denominator for diluted calculation)	<u>29,094,027</u>	<u>26,243,164</u>	<u>25,512,487</u>
Earnings per share:			
Basic	<u>\$ 1.37</u>	<u>\$ 4.31</u>	<u>\$ 3.47</u>
Diluted	<u>\$ 1.35</u>	<u>\$ 4.19</u>	<u>\$ 3.40</u>

For the year ended September 30, 2019, 2018, and 2017, approximately 0.2 million, 0.1 million and 0.4 million shares, respectively, attributable to outstanding stock options were excluded from the calculation of Diluted earnings per share.

22. SEGMENT REPORTING

We identify our segments based on our management structure and the financial information used by our chief executive officer, who is our chief operating decision maker, to assess segment performance and allocate resources among our operating units. We historically had operated predominantly in one industry segment – the development, manufacture and sale of Chemical Mechanical Planarization (CMP) consumables products. In connection with the Acquisition, we reassessed our operating and reportable segments, and determined that we have the following two reportable segments:

Electronic Materials

Electronic Materials includes products and solutions for the semiconductor industry. We manufacture and sell CMP consumables, including CMP slurries and polishing pads, and high-purity process chemicals used to etch and clean silicon wafers in the production of semiconductors, photovoltaics (solar cells) and flat panel displays.

Performance Materials

Performance Materials includes pipeline performance products and services, wood treatment products, and products and equipment used in the precision optics industry.

Beginning in fiscal 2019 and with the Acquisition, our chief operating decision maker evaluates segment performance based upon revenue and segment adjusted EBITDA. Segment adjusted EBITDA is defined as earnings before interest, income taxes, depreciation and amortization, adjusted for certain items that affect comparability from period to period. These adjustments include items related to the Acquisition, such as expenses incurred to complete the Acquisition, integration-related expenses and impact of fair value adjustments to inventory acquired from KMG, and certain costs related to the KMG-Bernuth warehouse fire, asset impairment and restructuring charges related to the wood treatment reporting unit. We exclude these items from earnings when presenting our adjusted EBITDA measure because we believe they will be incurred infrequently and/or are otherwise not indicative of a segment's regular, ongoing operating performance. Adjusted EBITDA is also the basis of a performance metric for our fiscal 2019 Short-Term Incentive Program (STIP). In addition, our chief operating decision maker does not use assets by segment to evaluate performance or allocate resources. Therefore, we do not disclose assets by segment.

Revenue from external customers by segment and are as follows:

	Year Ended September 30,		
	2019	2018	2017
Segment Revenue			
Electronic Materials	\$ 833,051	\$ 559,944	\$ 485,034
Performance Materials	204,645	30,179	22,145
Total	<u>\$ 1,037,696</u>	<u>\$ 590,123</u>	<u>\$ 507,179</u>

Capital expenditures by segment are as follows:

	Year Ended September 30,		
	2019	2018	2017
Capital Expenditures			
Electronic Materials	\$ 40,166	\$ 18,668	\$ 19,325
Performance Materials	16,367	409	414
Corporate	5,663	3,918	1,917
Total	<u>\$ 62,196</u>	<u>\$ 22,995</u>	<u>\$ 21,656</u>

Adjusted EBITDA by segment are as follows:

	Year Ended September 30,		
	2019	2018	2017
Segment adjusted EBITDA:			
Electronic Materials	\$ 294,902	\$ 222,019	\$ 169,044
Performance Materials	91,372	7,191	2,516
Unallocated corporate expenses	(52,856)	(39,266)	(34,050)
Interest expense	(45,681)	(2,905)	(4,529)
Interest income	2,346	4,409	2,351
Depreciation and amortization	(98,592)	(25,876)	(25,960)
Acquisition and integration related expenses	(34,709)	(3,861)	—
Charge for fair value write-up of acquired inventory sold	(14,869)	—	—
Costs related to KMG-Bernuth warehouse fire (See Note 20)	(9,905)	—	—
Costs related to restructuring of wood treatment	(1,530)	—	—
Charges related to asset impairment of wood treatment	(67,372)	—	—
Income before income taxes	<u>\$ 63,106</u>	<u>\$ 161,711</u>	<u>\$ 109,372</u>

We began to manage and report our results under the new organizational structure in conjunction with the Acquisition in fiscal 2019 and have reflected this change for all historical periods presented. Since the two segments operate independently and serve different markets and customers, there are no sales between segments. Revenue from external customers and segment adjusted EBITDA shown for Performance Materials for the year ended September 30, 2018 and 2017 include Cabot Microelectronics' heritage QED business. The adjustments to segment EBITDA for the year ended September 30, 2019 represent addbacks of the Acquisition and integration related expenses, and a charge for the write-up of inventory acquired from KMG to fair value for inventory sold in the period, costs related to KMG-Bernuth warehouse fire, and restructuring and asset impairment charges related to wood treatment business. The adjustments to segment EBITDA for the year ended September 30, 2018 represent addbacks of Acquisition and integration related expenses. There were no adjustments to segment EBITDA for the year ended September 30, 2017. The unallocated portions of corporate functions including finance, legal, human resources, information technology, and corporate development not directly attributable to a reportable segment.

23. FINANCIAL INFORMATION BY INDUSTRY SEGMENT, GEOGRAPHIC AREA AND PRODUCT LINE

We operate predominantly in two reportable segments - the Performance Materials and Electronic Materials. Revenues are attributed to the United States and foreign regions based upon the customer location and not the geographic location from which our products were shipped. Financial information by geographic area was as follows:

	Year Ended September 30,		
	2019	2018	2017
Revenue:			
North America	\$ 372,247	\$ 79,019	\$ 72,670
Asia	515,833	471,215	394,874
Europe, Middle East, and Africa	149,305	39,889	39,635
South America	311	—	—
Total	<u>\$ 1,037,696</u>	<u>\$ 590,123</u>	<u>\$ 507,179</u>
Property, plant and equipment, net:			
North America	\$ 133,682	\$ 60,818	\$ 52,155
Asia	68,823	50,573	54,201
Europe	74,313	12	5
Total	<u>\$ 276,818</u>	<u>\$ 111,403</u>	<u>\$ 106,361</u>

The following table shows revenue from sales to customers in foreign countries that accounted for more than ten percent of our total revenue in fiscal 2019, 2018 and 2017:

	Year Ended September 30,		
	2019	2018	2017
Revenue:			
South Korea	\$ 135,844	\$ 136,403	\$ 95,414
Taiwan	125,895	130,500	130,849
China	*	97,254	74,781

* Not a country with more than 10% revenue.

The following table shows revenue generated by product group in fiscal 2019, 2018 and 2017:

	Year Ended September 30,		
	2019	2018	2017
Revenue:			
Electronic Materials			
Slurries	\$ 460,053	\$ 476,828	\$ 416,361
Electronic Chemicals	278,413	—	—
CMP Pads	94,585	83,117	68,673
Total Electronic Materials	833,051	559,945	485,034
Performance Materials			
Pipeline	140,553	—	—
Wood Treatment	31,898	—	—
Precision Optics and other	32,194	30,178	22,145
Total Performance Materials	\$ 204,645	\$ 30,178	\$ 22,145
Total Revenue	\$ 1,037,696	\$ 590,123	\$ 507,179

SELECTED QUARTERLY OPERATING RESULTS

The following table presents our unaudited financial information for the eight quarterly periods ended September 30, 2019. This unaudited financial information has been prepared in accordance with accounting principles generally accepted in the United States of America, applied on a basis consistent with the annual audited financial statements and in the opinion of management, include all necessary adjustments, which consist only of normal recurring adjustments necessary to present fairly the financial results for the periods. The results for any quarter are not necessarily indicative of results for any future period.

CABOT MICROELECTRONICS CORPORATION SELECTED QUARTERLY OPERATING RESULTS (Unaudited and in thousands, except per share amounts)

	Sept. 30, 2019	June 30, 2019	March 31, 2019	Dec. 31, 2018	Sept. 30, 2018	June 30, 2018	March 31, 2018	Dec. 31, 2017
Revenue	\$ 278,645	\$ 271,882	\$ 265,391	\$ 221,778	\$ 156,729	\$ 150,437	\$ 142,978	\$ 139,979
Cost of sales	165,535	156,492	150,571	122,445	72,383	69,737	67,933	65,965
Gross profit	113,110	115,390	114,820	99,333	84,346	80,700	75,045	74,014
Operating expenses:								
Research, development and technical	12,698	12,191	12,778	14,040	13,372	13,059	13,368	12,151
Selling, general and administrative	50,663	50,959	50,328	61,128	26,986	25,711	24,589	24,751
Asset Impairment Expenses	67,372	—	—	—	—	—	—	—
Total operating expenses	130,733	63,150	63,106	75,168	40,358	38,770	37,957	36,902
Operating income	(17,623)	52,240	51,714	24,165	43,988	41,930	37,088	37,112
Interest expense	12,703	12,757	13,331	6,890	102	513	1,158	1,132
Interest income	342	417	568	1,019	1,161	1,141	1,156	951
Other income (expense), net	(1,158)	(472)	(1,014)	(1,411)	(24)	486	(94)	(279)
Income before income taxes	(31,142)	39,428	37,937	16,883	45,023	43,044	36,992	36,652
Provision for income taxes	(10,899)	20,550	10,800	3,440	(3,195)	7,873	7,255	39,735
Net income (loss)	\$ (20,243)	\$ 18,878	\$ 27,137	\$ 13,443	\$ 48,218	\$ 35,171	\$ 29,737	\$ (3,083)
Basic earnings (loss) per share	\$ (0.70)	\$ 0.65	\$ 0.94	\$ 0.50	\$ 1.89	\$ 1.37	\$ 1.16	\$ (0.12)
Weighted average basic shares outstanding	29,084	29,064	28,998	27,157	25,520	25,612	25,593	25,326
Diluted earnings (loss) per share	\$ (0.70)	\$ 0.64	\$ 0.92	\$ 0.48	\$ 1.84	\$ 1.34	\$ 1.14	\$ (0.12)
Weighted average diluted shares outstanding	29,084	29,568	29,479	27,762	26,213	26,319	26,161	25,326

SCHEDULE II - VALUATION AND QUALIFYING ACCOUNTS

The following table sets forth activities in our allowance for doubtful accounts:

Allowance For Doubtful Accounts	Balance At Beginning of Year	Amounts Charged To Expenses	Deductions and Adjustments	Balance At End of Year
Year ended:				
September 30, 2019	\$ 1,900	\$ 432	\$ 45	\$ 2,377
September 30, 2018	1,747	185	(32)	1,900
September 30, 2017	1,828	26	(107)	1,747

We have provided a valuation allowance on certain deferred tax assets. The following table sets forth activities in our valuation allowance:

Valuation Allowance	Balance At Beginning of Year	Amounts Charged To Expenses	Deductions and Adjustments	Balance At End of Year
Year ended:				
September 30, 2019	\$ 133	\$ 2,432	\$ —	\$ 2,565
September 30, 2018	2,271	—	(2,138)	133
September 30, 2017	3,022	—	(751)	2,271

MANAGEMENT RESPONSIBILITY

The accompanying consolidated financial statements were prepared by the Company in conformity with accounting principles generally accepted in the United States of America. The Company's management is responsible for the integrity of these statements and of the underlying data, estimates and judgments.

The Company's management establishes and maintains a system of internal accounting controls designed to provide reasonable assurance that its assets are safeguarded from loss or unauthorized use, transactions are properly authorized and recorded, and that financial records can be relied upon for the preparation of the consolidated financial statements. This system includes written policies and procedures, a code of business conduct and an organizational structure that provides for appropriate division of responsibility and the training of personnel. This system is monitored and evaluated on an ongoing basis by management in conjunction with its internal audit function.

The Company's management assesses the effectiveness of its internal control over financial reporting on an annual basis. In making this assessment, management uses the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission in Internal Control – Integrated Framework (2013). Management acknowledges, however, that all internal control systems, no matter how well designed, have inherent limitations and can provide only reasonable assurance with respect to financial statement preparation and presentation. In addition, the Company's independent registered public accounting firm evaluates the Company's internal control over financial reporting and performs such tests and other procedures as it deems necessary to reach and express an opinion on the fairness of the financial statements.

In addition, the Audit Committee of the Board of Directors provides general oversight responsibility for the financial statements. Composed entirely of Directors who are independent and not employees of the Company, the Committee meets periodically with the Company's management, internal auditors and the independent registered public accounting firm to review the quality of financial reporting and internal controls, as well as results of auditing efforts. The internal auditors and independent registered public accounting firm have full and direct access to the Audit Committee, with and without management present.

/s/ David H. Li

David H. Li
Chief Executive Officer

/s/ Scott D. Beamer

Scott D. Beamer
Chief Financial Officer

/s/ Thomas S. Roman

Thomas S. Roman
Principal Accounting Officer

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None.

ITEM 9A. CONTROLS AND PROCEDURES

EVALUATION OF DISCLOSURE CONTROLS AND PROCEDURES

Our management, with the participation of our Chief Executive Officer (CEO) and Chief Financial Officer (CFO), has evaluated the effectiveness of the design and operation of our disclosure controls and procedures (as defined in Rule 13a-15(e) under the Securities Exchange Act of 1934, as amended ("the Exchange Act")), as of September 30, 2019. Based on that evaluation, our CEO and CFO have concluded that our disclosure controls and procedures were effective to ensure that information required to be disclosed in our Exchange Act reports is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms, and to ensure that such information is accumulated and communicated to management, including the CEO and CFO, as appropriate to allow timely decisions regarding required disclosure.

While we believe the present design of our disclosure controls and procedures is effective enough to make known to our senior management in a timely fashion all material information concerning our business, we intend to continue to improve the design and effectiveness of our disclosure controls and procedures to the extent necessary in the future to provide our senior management with timely access to such material information, and to correct any deficiencies that we may discover in the future, as appropriate.

MANAGEMENT'S REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING

Our management is responsible for establishing and maintaining adequate internal control over financial reporting for the Company. Internal control over financial reporting is defined in Rule 13a-15 (for Rule 15d-15(f) promulgated under the Exchange Act as a process designed by, or under the supervision of, the Company's CEO and CFO, or person's performing similar functions, and effected by the Company's board of directors, management and other personnel to provide reasonable assurance regarding the reliability of our financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles in the United States of America. Internal control over financial reporting includes policies and procedures that: pertain to the maintenance of records that in reasonable detail accurately and fairly reflect our transactions and dispositions of the Company's assets; provide reasonable assurance that transactions are recorded as necessary for preparation of our financial statements in accordance with generally accepted accounting principles; provide reasonable assurance that receipts and expenditures of Company assets are made in accordance with management authorization; and provide reasonable assurance that unauthorized acquisition, use or disposition of Company assets that could have a material effect on our financial statements would be prevented or detected on a timely basis. Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Based upon SEC staff guidance, management has excluded KMG from the scope of our assessment of internal control over financial reporting, as of September 30, 2019 because it was acquired by the Company in a purchase business combination during fiscal 2019. As of September 30, 2019 and for the period from Acquisition through September 30, 2019, total assets and total revenue of KMG represented 14.0% and 43.5%, respectively, of the Company's consolidated total assets and total revenues, as of and for the year ended September 30, 2019.

Our management evaluated the effectiveness of our internal control over financial reporting based on the framework in *Internal Control-Integrated Framework* (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission ("COSO"). Based on this evaluation, our management concluded that the Company's internal control over financial reporting was effective as of September 30, 2019. The effectiveness of the Company's internal control over financial reporting as of September 30, 2019 has been audited by PricewaterhouseCoopers LLP, an independent registered public accounting firm, as stated in their report which appears under Item 8 of this Annual Report on Form 10-K.

CHANGES IN INTERNAL CONTROL OVER FINANCIAL REPORTING

There were no changes in our internal control over financial reporting that occurred during our most recent fiscal quarter that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

INHERENT LIMITATIONS ON EFFECTIVENESS OF CONTROLS

Because of inherent limitations, our disclosure controls or our internal control over financial reporting may not prevent all errors and all fraud. A control system, no matter how well conceived and operated, can provide only reasonable, not absolute, assurance that the objectives of the control system are met. Further, the design of a control system must reflect the fact that there are resource constraints, and the benefits of controls must be considered relative to their costs. Because of the inherent limitations in all control systems, no evaluation of controls can provide absolute assurance that all control issues and instances of fraud, if any, within the Company have been detected. These inherent limitations include the realities that judgments in decision-making can be faulty, and that breakdowns can occur because of a simple error or mistake. Additionally, controls can be circumvented by the individual acts of some persons, by collusion of two or more people or by management override of the controls. The design of any system of controls also is based in part upon certain assumptions about the likelihood of future events, and there can be no assurance that any design will succeed in achieving its stated goals under all potential future conditions; over time, controls may become inadequate because of changes in conditions, or the degree of compliance with policies or procedures may deteriorate. Because of the inherent limitations in a cost-effective control system, misstatements due to error or fraud may occur and not be detected.

ITEM 9B. OTHER INFORMATION

None.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

The information required by Item 10 of Form 10-K with respect to identification of directors, the existence of a separately-designated standing audit committee, identification of members of such committee, and identification of an audit committee financial expert, is incorporated by reference from the information contained in the sections captioned "Election of Directors" and "Board Structure and Compensation" in our definitive Proxy Statement for the Annual Meeting of Stockholders to be held March 4, 2020 (the "Proxy Statement"). In addition, for information with respect to the executive officers of our Company, see "Information about our Executive Officers" in Part I of this Annual Report on Form 10-K and the section captioned "Section 16(a) Beneficial Ownership Reporting Compliance" in the Proxy Statement. Information required by Item 405 of Regulation S-K is incorporated by reference from the information contained in the section captioned "Section 16(a) Beneficial Ownership Reporting Compliance" in the Proxy Statement.

We have adopted a code of business conduct for all of our employees and directors, including our principal executive officer, other executive officers, principal financial officer and senior financial personnel. A copy of our code of business conduct is available free of charge on our Company website at www.cabotcmp.com. We intend to post on our website any material changes to, or waivers from, our code of business conduct, if any, within two days of any such event.

ITEM 11. EXECUTIVE COMPENSATION

The information required by Item 11 of Form 10-K is incorporated by reference from the information contained in the section captioned "Executive Compensation" in the Proxy Statement.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS
EQUITY COMPENSATION PLAN INFORMATION

Shown below is information as of September 30, 2019, with respect to the shares of common stock that may be issued under Cabot Microelectronics' existing equity compensation plans.

Plan category	(a) Number of securities to be issued upon exercise of outstanding options, warrants and rights	(b) Weighted-average exercise price of outstanding options, warrants and rights	(c) Number of securities remaining available for future issuance under equity compensation plans (excluding securities reflected in column (a))
Equity compensation plans approved by security holders (1)	1,153,321 (2)	\$ 63.44 (2)	2,391,804 (3)
Equity compensation plans not approved by security holders			
Total	1,153,321 (2)	\$ 63.44 (2)	2,391,804 (3)

- (1) Equity Compensation plans consist of our Second Amended and Restated Cabot Microelectronics Corporation 2000 Equity Incentive Plan (EIP), as amended and restated September 23, 2008, our Cabot Microelectronics Corporation 2012 Omnibus Incentive Plan, as amended effective March 7, 2017 (OIP), and our Cabot Microelectronics Corporation 2007 Employee Stock Purchase Plan, as Amended and Restated September 23, 2013 (ESPP). As of March 6, 2012, all securities available for future issuance under the EIP were transferred to the OIP and since then the EIP no longer has been available for any future awards. All share amounts in the above table reflect the effect of our 2012 leveraged recapitalization with a special cash dividend. See Note 16 of "Notes to the Consolidated Financial Statements" of this Annual Report on Form 10-K for more information regarding our equity compensation plans.
- (2) Column (a) includes 215,215 shares that employees and non-employee directors have the right to acquire upon the vesting of the equivalent restricted stock units that they have been awarded under our equity incentive plans, and 59,082 initial granted shares that certain employees have the right to acquire upon the vesting of the performance-based restricted stock units that they have been awarded under our equity incentive plans, which may be subject to downward or upward adjustment depending on the performance measures during the particular performance period pursuant to the PSU award agreement. Column (b) excludes all of these from the weighted-average exercise price.
- (3) Column (c) includes 336,684 shares available for future issuance under the ESPP.

The other information required by Item 12 of Form 10-K is incorporated by reference from the information contained in the section captioned "Stock Ownership" in the Proxy Statement.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS AND DIRECTOR INDEPENDENCE

The information required by Item 13 of Form 10-K is incorporated by reference from the information contained in the section captioned "Certain Relationships and Related Transactions" in the Proxy Statement.

ITEM 14. PRINCIPAL ACCOUNTANT FEES AND SERVICES

The information required by Item 14 of Form 10-K is incorporated by reference from the information contained in the section captioned "Fees of Independent Auditors and Audit Committee Report" in the Proxy Statement.

PART IV

ITEM 15. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES

(a) The following Financial Statements and Financial Statement Schedule are included in Item 8 herein:

1. Financial Statements:

- Report of Independent Registered Public Accounting Firm
- Consolidated Statements of Income for the years ended September 30, 2019, 2018 and 2017
- Consolidated Statements of Comprehensive Income for the years ended September 30, 2019, 2018 and 2017
- Consolidated Balance Sheets at September 30, 2019 and 2018
- Consolidated Statements of Cash Flows for the years ended September 30, 2019, 2018 and 2017
- Consolidated Statements of Changes in Stockholders' Equity for the years ended September 30, 2019, 2018 and 2017
- Notes to the Consolidated Financial Statements

2. Financial Statement Schedule: Schedule II – Valuation and Qualifying Accounts for the years ended September 30, 2019, 2018 and 2017

3. Exhibits - The following exhibits are filed as part of, or incorporated by reference into, this Report on Form 10-K:

Exhibit No.	Description	Filed as an exhibit to, and incorporated by reference from		
		Form	File No.	Filing Date
2.1	<u>Agreement and Plan of Merger, dated as of September 27, 2015, by and among NexPlanar Corporation, Cabot Microelectronics Corporation, Matrix Merger Co., and Shareholder Representative Services LLC solely in its capacity as representative.</u>	8-K	000-30205	September 28, 2015
2.2	<u>Agreement and Plan of Merger, dated as of August 14, 2018, by and among KMG Chemicals, Inc., Cabot Microelectronics Corporation, and Cobalt Merger Sub Corporation.</u>	8-K	000-30205	August 17, 2018
3.2	<u>(Third) Amended and Restated By-Laws of Cabot Microelectronics Corporation.</u>	8-K	000-30205	March 6, 2017
3.3	<u>Form of Amended and Restated Certificate of Incorporation of Cabot Microelectronics Corporation.</u>	S-1	333-95093	March 27, 2000
4.1	<u>Form of Cabot Microelectronics Corporation Common Stock Certificate.</u>	S-1	333-95093	April 3, 2000
4.2	<u>Description of the Company's Securities</u>			
10.1	<u>Second Amended and Restated Cabot Microelectronics Corporation 2000 Equity Incentive Plan, as amended and restated September 23, 2008.*</u>	10-K	000-30205	November 25, 2008
10.2	<u>Form of Second Amended and Restated Cabot Microelectronics Corporation 2000 Equity Incentive Plan Non-Qualified Stock Option Grant Agreement (non-employee directors).*</u>	10-Q	000-30205	May 9, 2011
10.4	<u>Form of Second Amended and Restated Cabot Microelectronics Corporation 2000 Equity Incentive Plan Non-Qualified Stock Option Grant Agreement (employees (including executive officers)).*</u>	10-Q	000-30205	February 8, 2011
10.15	<u>Cabot Microelectronics Corporation 2007 Employee Stock Purchase Plan, as Amended and Restated September 23, 2013.*</u>	10-K	000-30205	November 20, 2013
10.22	<u>Cabot Microelectronics Corporation 401(k) Plan, as amended.*</u>	10-Q	000-30205	February 8, 2010

10.23	<u>Form of Amended and Restated Change in Control Severance Protection Agreement.**</u>	10-K	000-30205	November 25, 2008
10.28	<u>Directors' Deferred Compensation Plan, as amended September 23, 2008.*</u>	10-K	000-30205	November 25, 2008
10.30	<u>Form of Deposit Share Agreement.***</u>	10-Q	000-30205	February 8, 2013
10.33	<u>Adoption Agreement, as amended September 23, 2008, of Cabot Microelectronics Corporation Supplemental Employee Retirement Plan.*</u>	10-K	000-30205	November 25, 2008
10.34	<u>Code of Business Conduct.</u>	10-Q	000-30205	February 8, 2011
10.36	<u>Directors' Cash Compensation Umbrella Program.*</u>	10-K	000-30205	December 10, 2003
10.53	<u>Cabot Microelectronics Corporation Supplemental Employee Retirement Plan, as amended.*</u>	10-K	000-30205	November 25, 2008
10.57	<u>Adoption Agreement, as amended January 1, 2010, of Cabot Microelectronics Corporation 401(k) Plan.*</u>	10-Q	000-30205	February 8, 2010
10.58	<u>Employee Stock Purchase Plan Prospectus as of November 24, 2010.*</u>	10-Q	000-30205	February 8, 2011
10.60	<u>Cabot Microelectronics Corporation 2012 Omnibus Incentive Plan, as amended effective March 7, 2017. *ration 2012 Omnibus Incentive Plan, as amended effective March 7, 2017.*</u>	10-Q	000-30205	May 5, 2017
10.61	<u>Form of Cabot Microelectronics Corporation 2012 Omnibus Incentive Plan Non-Qualified Stock Option Grant Agreement (Form of Cabot Microelectronics Corporation 2012 Omnibus Incentive Plan Non-Qualified Stock Option Grant Agreement (employees (including executive officers)).* (including executive officers)).*</u>	10-Q	000-30205	February 8, 2013
10.62	<u>Form of Cabot Microelectronics Corporation 2012 Omnibus Incentive Plan Restricted Stock Award Agreement (employees (including executive officers)).*</u>	10-Q	000-30205	February 8, 2013
10.63	<u>Form of Cabot Microelectronics Corporation 2012 Omnibus Incentive Plan Non-Qualified Stock Option Grant Agreement (non-employee directors).*</u>	10-Q	000-30205	August 8, 2012
10.64	<u>Form of Cabot Microelectronics Corporation 2012 Omnibus Incentive Plan Restricted Stock Units Award Agreement (non-employee directors).*</u>	10-Q	000-30205	August 8, 2012
10.65	<u>Employment Offer Letter dated December 12, 2014 (David H. Li).*</u>	10-Q	000-30205	February 6, 2015
10.66	<u>Cabot Microelectronics Corporation Short Term Incentive Program*</u>	10-Q	000-30205	February 8, 2016
10.67	<u>Cabot Microelectronics Corporation 2012 Omnibus Incentive Plan Fiscal Year 20[] Restricted Unit Award Agreement for United States Employees*</u>	10-Q	000-30205	February 8, 2016
10.68	<u>Cabot Microelectronics Corporation 2012 Omnibus Incentive Plan Fiscal Year 20[] Non-Qualified Stock Option Award Agreement for United States Employees*</u>	10-Q	000-30205	February 7, 2018
10.69	<u>Cabot Microelectronics Corporation 2012 Omnibus Incentive Plan Fiscal Year 20[] Restricted Stock Unit Award Agreement for United States Employees*</u>	10-Q	000-30205	February 7, 2018
10.70	<u>Cabot Microelectronics Corporation 2012 Omnibus Incentive Plan Fiscal Year 20[] Performance Share Unit Award Agreement for United States Employees*</u>	10-Q	000-30205	February 7, 2018
10.71	<u>Credit Agreement, dated as of November 15, 2018, by and among Cabot Microelectronics Corporation, the lenders party thereto and JPMorgan Chase Bank, N.A., as administrative agent.</u>	8-K	000-30205	November 15, 2018

21.1	<u>Subsidiaries of Cabot Microelectronics Corporation.</u>
23.1	<u>Consent of Independent Registered Public Accounting Firm.</u>
24.1	<u>Power of Attorney.</u>
31.1	<u>Certification of Chief Executive Officer as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.</u>
31.2	<u>Certification of Chief Financial Officer as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.</u>
32.1	<u>Certification pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.</u>
101.INS	XBRL Instance Document – The Instance Document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document.
101.SCH	XBRL Taxonomy Extension Schema
101.CAL	XBRL Taxonomy Extension Calculation Linkbase
101.DEF	XBRL Taxonomy Extension Definition Linkbase
101.LAB	XBRL Taxonomy Extension Label Linkbase
101.PRE	XBRL Taxonomy Extension Presentation Linkbase
104	Cover Page Interactive Data File - The Cover Page Interactive Data File does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document.
	* Management contract, or compensatory plan or arrangement.
	** Substantially similar change in control severance protection agreements have been entered into with David H. Li, Scott D. Beamer, H. Carol Bernstein, Eleanor K. Thorp, Jeffrey M. Dysard, Colleen E. Mumford, Thomas S. Roman, and Daniel D. Woodland, with differences only in the amount of payments and benefits to be received by such persons.
	*** Substantially similar deposit share agreements have been entered into with David H. Li, with differences only in the amount of initial deposit made and deposit shares purchased by such persons.

SIGNATURES

Pursuant to the requirements of section 13 or 15(d) of the Securities Exchange Act of 1934, as amended, the registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized:

CABOT MICROELECTRONICS CORPORATION

Date: November 27, 2019 /s/ DAVID H. LI

David H. Li
President and Chief Executive Officer
[Principal Executive Officer]

Date: November 27, 2019 /s/ SCOTT D BEAMER

Scott D. Beamer
Vice President and Chief Financial Officer
[Principal Financial Officer]

Date: November 27, 2019 /s/ THOMAS S. ROMAN

Thomas S. Roman
Corporate Controller
[Principal Accounting Officer]

Pursuant to the requirements of the Securities Exchange Act of 1934, as amended, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated:

Date: November 27, 2019 /s/ WILLIAM P. NOGLOWS*

William P. Noglows
Chairman of the Board
[Director]

Date: November 27, 2019 /s/ DAVID H. LI

David H. Li
President and Chief Executive Officer
[Director]

Date: November 27, 2019 /s/ RICHARD S. HILL*

Richard S. Hill
[Director]

Date: November 27, 2019 /s/ BARBARA A. KLEIN*

Barbara A. Klein
[Director]

Date: November 27, 2019 /s/ PAUL J. REILLY*

Paul J. Reilly
[Director]

Date: November 27, 2019 /s/ SUSAN M. WHITNEY*

Susan M. Whitney
[Director]

Date: November 27, 2019 /s/ GEOFFREY WILD*

Geoffrey Wild
[Director]

* by H. Carol Bernstein as Attorney-in-fact pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, as amended.

**DESCRIPTION OF THE REGISTRANT'S SECURITIES
REGISTERED PURSUANT TO SECTION 12 OF THE
SECURITIES EXCHANGE ACT OF 1934**

The following summary of the capital stock of Cabot Microelectronics Corporation does not purport to be complete and is qualified in its entirety by reference to our amended and restated certificate of incorporation (as amended, our "charter"), our (third) amended and restated by-laws (our "by-laws", and together with our charter, our "organizational documents"), each of which are incorporated by reference as an exhibit to the Annual Report on Form 10-K of which this Exhibit is a part, and certain provisions of Delaware law. Unless the context requires otherwise, all references to "we", "us," "our" and "Cabot Microelectronics" in this section refer solely to Cabot Microelectronics Corporation and not to our subsidiaries.

General

Under our charter, Cabot Microelectronics' authorized capital stock consists of 20,000,000 shares of common stock, \$0.001 par value per share, and 200,000,000 shares of preferred stock, \$0.001 par value per share. As of October 31, 2019, there were 29,104,190 shares of Cabot Microelectronics common stock outstanding and no shares of Cabot Microelectronics preferred stock outstanding. All outstanding shares of Cabot Microelectronics common stock are duly authorized, validly issued, fully paid and non-assessable.

Common Stock

Voting

Holders of Cabot Microelectronics common stock are entitled to one vote per share on all matters to be voted on by Cabot Microelectronics stockholders. Holders of Cabot Microelectronics common stock do not have cumulative rights, so that holders of a majority of the shares of Cabot Microelectronics common stock present at a meeting at which a quorum is present are able to elect all of Cabot Microelectronics directors eligible for election in a given year. The holders of a majority of the voting power of the issued and outstanding Cabot Microelectronics common stock constitute a quorum.

Dividends

Holders of Cabot Microelectronics common stock are entitled to receive ratably the dividends, if any, that are declared by the Cabot Microelectronics board of directors. The Cabot Microelectronics board of directors may declare dividends out of funds legally available for the declaration of dividends, subject to the preferential rights of any holder of preferred stock that may from time to time be outstanding.

Liquidation Rights

Upon the liquidation, dissolution or winding up of Cabot Microelectronics, the holders of Cabot Microelectronics common stock are entitled to share pro rata in the distribution of all of the assets available for distribution after satisfaction of all liabilities and the payment of the liquidation preference of any preferred stock that may be outstanding.

Other Matters

The holders of Cabot Microelectronics common stock will have no preemptive or other subscription rights to purchase common stock, and there are no redemptive rights or sinking fund provisions.

The rights, preferences and privileges of holders of Cabot Microelectronics common stock are subject to and may be adversely affected by the rights of the holders of shares of any series of preferred stock that Cabot Microelectronics may designate and issue in the future.

Cabot Microelectronics common stock is listed on The Nasdaq Global Select Market under the symbol "CCMP."

The transfer agent and registrar for Cabot Microelectronics common stock is Computershare Trust Company, N.A.

Preferred Stock

The Cabot Microelectronics board of directors is authorized to cause shares of preferred stock to be issued in one or more series, to:

- determine the number of shares of each series;
- fix the rights, powers, preferences and privileges of each series;
- fix any qualifications, limitations or restrictions thereon; and
- increase or decrease the number of shares of each such series.

Among the specific matters that may be determined by the board of directors are:

- the annual rate of dividends;
- the redemption price, if any;
- the terms of a sinking or purchase fund, if any;
- the amount payable in the event of any voluntary liquidation, dissolution or winding up of the affairs of Cabot Microelectronics;
- conversion rights, if any; and
- voting powers, if any.

Depending upon the terms of the preferred stock established by the Cabot Microelectronics board of directors, any or all series of preferred stock could have preferences over the common stock with respect to dividends and other distributions and upon liquidation or could have voting or conversion rights that could adversely affect the holders of the outstanding common stock.

Certain Effects of Authorized but Unissued Stock

Cabot Microelectronics has shares of common stock and preferred stock available for future issuance without stockholder approval. Cabot Microelectronics may utilize these additional shares for a variety of corporate purposes, including future public offerings to raise additional capital or facilitate corporate acquisitions or for payment as a dividend on the capital stock. The existence of unissued and unreserved common stock and preferred stock may enable the Cabot Microelectronics board of directors to issue shares to persons friendly to current management or to issue preferred stock with terms that could render more difficult or discourage a third-party attempt to obtain control of Cabot Microelectronics by means of a merger, tender offer, proxy contest or otherwise, thereby protecting the continuity of Cabot Microelectronics' management.

Provisions of Cabot Microelectronics Charter, Cabot Microelectronics Bylaws and DGCL That May Have Anti-Takeover Effects

The Cabot Microelectronics charter, the Cabot Microelectronics bylaws and Section 203 of the Delaware General Corporation Law (“DGCL”) contain provisions summarized below that may delay, discourage or prevent the acquisition or control of Cabot Microelectronics by means of a tender offer, open market purchase, proxy fight or otherwise, including acquisitions that might result in a premium being paid over the market price of the common stock.

Stockholder Action by Written Consent; Special Meetings

Any action required or permitted to be taken by Cabot Microelectronics stockholders may be effected only at a duly called annual or special meeting of stockholders and may not be effected by a written consent in lieu of a meeting of stockholders. Except as otherwise required by law and subject to the rights of the holders of any preferred stock, special meetings of stockholders for any purpose may be called only by the Cabot Microelectronics board of directors, its chairman or, at the written request of a majority of the Cabot Microelectronics board of directors, the president.

Advance Notice Procedures

The Cabot Microelectronics bylaws require advance notice of the nomination, other than by or at the direction of the Cabot Microelectronics board of directors, of candidates for election as directors, as well as for other stockholder proposals, to be considered at special meetings of stockholders. Subject to certain exceptions, notice of intent to nominate a director or raise matters at these meetings will have to be received in writing not less than 90 nor more than 120 days prior to the anniversary of the previous year's annual meeting of stockholders, and must contain specific information concerning the person to be nominated or the matters to be brought before the meeting and concerning the stockholder submitting the proposal. If the chairman of a meeting determines that an individual was not nominated, or other business was not brought before the meeting, in accordance with the advance notice procedures, that individual will not be eligible for election as a director, or that business will not be conducted at such meeting, as the case may be.

Board of Directors

The Cabot Microelectronics charter and bylaws provide that the number of directors shall be determined from time to time by a resolution adopted by the majority of the Cabot Microelectronics directors. The Cabot Microelectronics charter and bylaws also provide that the board of directors be divided into three classes, as nearly equal in number as possible. Each director holds office until that person's successor is duly elected and qualified. Vacancies on the board of directors are filled by a majority of the remaining directors, or by a sole remaining director, or by Cabot Microelectronics stockholders if the vacancy was caused by the action of Cabot Microelectronics stockholders.

Any director may be removed from office with or without cause upon the affirmative vote of holders of at least 80% of the Cabot Microelectronics outstanding common stock, voting as a single class. A director may not be removed by the stockholders at a meeting unless the notice of the meeting states that the purpose, or one of the purposes, of the meeting is removal of the director.

Adoption, Amendment or Repeal of Charter or Bylaws

The Cabot Microelectronics charter provides that the affirmative vote of holders of at least 80% of Cabot Microelectronics outstanding common stock is required to amend, repeal or adopt any provision of the Cabot Microelectronics charter inconsistent with the provisions of that certificate regarding amendments to the Cabot Microelectronics bylaws, stockholder action by written consent, special meetings of stockholders, the Cabot Microelectronics board of directors and the election and removal of directors. The Cabot Microelectronics charter further provides that the Cabot Microelectronics bylaws may be altered, amended or repealed only by the Cabot Microelectronics board of directors or upon the affirmative vote of holders of at least 80% of the Cabot Microelectronics outstanding common stock, voting together as a single class.

Takeover Statutes

Section 203 of the DGCL generally prohibits "business combinations," including mergers, sales and leases of assets, issuances of securities and similar transactions by a corporation or a subsidiary with an interested stockholder who beneficially owns 15% or more of a corporation's voting stock, within three years after the person or entity becomes an interested stockholder, unless: (i) the board of directors of the target corporation has approved, before the acquisition time, either the business combination or the transaction that resulted in the person becoming an interested stockholder, (ii) upon consummation of the transaction that resulted in the person becoming an interested stockholder, the person owns at least 85% of the corporation's voting stock (excluding shares owned by directors who are officers and shares owned by employee stock plans in which participants do not have the right to determine confidentially whether shares will be tendered in a tender or exchange offer) or (iii) after the person or entity becomes an interested stockholder, the business combination is approved by the board of directors and authorized at a meeting of stockholders by the affirmative vote of at least 66²/₃% of the outstanding voting stock not owned by the interested stockholder. Cabot Microelectronics has not opted out of the protections of Section 203 of the DGCL.

EXHIBIT 21.1

SUBSIDIARIES OF CABOT MICROELECTRONICS CORPORATION

Cabot Microelectronics Global Corporation (Delaware, U.S.)
NexPlanar Corporation (Delaware, U.S.)
QED Technologies International, Inc. (Delaware, U.S.)
Cabot Microelectronics Japan KK (Japan)
Nihon Cabot Microelectronics KK (Japan)
Cabot Microelectronics B.V. (Netherlands)
Cabot Microelectronics Singapore Pte. Ltd. (Singapore)
Hanguk Cabot Microelectronics, LLC (South Korea)
Epoch Material Co., Ltd. (Taiwan)
Shanghai Cabot Microelectronics Co. Ltd. (China)
KMG Chemicals, Inc. (Texas, U.S.)
KMG-Bernuth, Inc. (Delaware, U.S.)
KMG de Mexico SA de CV (Mexico)
KMG Electronic Chemicals, Inc. (Texas, U.S.)
KMG Italia Srl (Italy)
KMG Electronic Chemicals Luxembourg Holdings S.a.r.l. (Luxembourg)
KMG Electronic Chemicals SAS (France)
KMG Ultra Pure Chemicals SAS (France)
KMG Electronic Chemicals, Pte. Ltd. (Singapore)
KMG Singapore Pte. Ltd. (Singapore)
KMG Ultra Pure Chemicals SDN BHD (Malaysia)
KMG Electronic Chemicals Limited (United Kingdom)
KMG Ultra Pure Chemicals Limited (United Kingdom)
KMG Industrial Lubricants Canada, Inc. (British Columbia, Canada)
KMG Val-Tex, LLC (Texas, U.S.)
Sealweld Corporation (2003), Inc. (Nevada, U.S.)
Sealweld (USA), Inc. (Texas, U.S.)
KMG FCM, Inc. (Delaware, U.S.)
KMG-Flowchem, Inc. (Delaware, U.S.)
Flowchem Holdings LLC (Delaware, U.S.)
Flowchem Intermediate Holdings, LLC (Delaware, U.S.)
Flowchem Acquisition LLC (Delaware, U.S.)
Flowchem LLC (Delaware, U.S.)
Flowchem Export Company (Texas, U.S.)
FLX Inc. (Texas, U.S.)
MPower Specialty Chemicals LLC (Texas, U.S.)

EXHIBIT 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statements on Form S-8 (No. 333-34272, 333-34270, 333-82680, 333-123692, 333-170810, 333-179955, and 333-232088) and Form S-4 (No. 333-227301) of Cabot Microelectronics Corporation of our report dated November 27, 2019 relating to the financial statements and financial statement schedule and the effectiveness of internal control over financial reporting, which appears in this Form 10-K.

/s/ PricewaterhouseCoopers LLP
Chicago, Illinois
November 27, 2019

EXHIBIT 24.1**POWER OF ATTORNEY**

Know all persons by these presents, that each person whose signature appears below constitutes and appoints H. Carol Bernstein, their Attorney-in-fact, with the power of substitution, for him or her in any and all capacities, to sign the annual report on Form 10-K for the fiscal year ended September 30, 2019 and any amendments to this Report on Form 10-K, and to file the same, with exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, hereby ratifying and confirming all that said Attorney-in-fact, or her substitute or substitutes, may do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, as amended, this Report has been signed below by the following persons on behalf of the Registrant and in the capacities and on the dates indicated.

<u>SIGNATURE</u>	<u>TITLE</u>	<u>Date</u>
<u>/s/ William P. Noglows</u> William P. Noglows	Chairman of the Board	November 27, 2019
<u>/s/ David H. Li</u> David H. Li	President and Chief, Executive Officer	November 27, 2019
<u>/s/ Richard S. Hill</u> Richard S. Hill	Director	November 27, 2019
<u>/s/ Barbara A. Klein</u> Barbara A. Klein	Director	November 27, 2019
<u>/s/ Paul J. Reilly</u> Paul J. Reilly	Director	November 27, 2019
<u>/s/ Susan M. Whitney</u> Susan M. Whitney	Director	November 27, 2019
<u>/s/ Geoffrey Wild</u> Geoffrey Wild	Director	November 27, 2019

Exhibit 31.1

CERTIFICATION

I, David H. Li, certify that:

1. I have reviewed this Annual Report on Form 10-K of Cabot Microelectronics Corporation;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of registrant's board of directors:
 - (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: November 27, 2019

/s/ DAVID H. LI

David H. Li
Chief Executive Officer

Exhibit 31.2

CERTIFICATION

I, Scott D. Beamer, certify that:

1. I have reviewed this Annual Report on Form 10-K of Cabot Microelectronics Corporation;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of registrant's board of directors:
 - (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: November 27, 2019

/s/ SCOTT D. BEAMER

Scott D. Beamer
Chief Financial Officer

Exhibit 32.1

**CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

In connection with the Annual Report of Cabot Microelectronics Corporation (the "Company") on Form 10-K for the fiscal year ended September 30, 2019, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), each of the undersigned officers of the Company certifies, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that:

- (1) The Report fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended; and
- (2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: November 27, 2019

/s/ DAVID H. LI

David H. Li
Chief Executive Officer

Date: November 27, 2019

/s/ SCOTT D. BEAMER

Scott D. Beamer
Chief Financial Officer



 **Cabot
Microelectronics**