UNIVERSAL DISPLAY CORP \PA\
Form 10-Q
August 03, 2017

UNITED STATES

SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-Q

(Mark One)

QUARTERLY REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the quarterly period ended June 30, 2017

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 1-12031

UNIVERSAL DISPLAY CORPORATION

(Exact name of registrant as specified in its charter)

Pennsylvania	23-2372688
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)

375 Phillips Boulevard, Ewing, New Jersey	08618
(Address of principal executive offices)	(Zip Code)

Registrant's telephone number, including area code: (609) 671-0980

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 and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post 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 the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer		Accelerated filer
Non-accelerated filer	(Do not check if a smaller reporting company)	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 account 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 Exchange Act). Yes No

As of August 2, 2017, the registrant had outstanding 47,031,137 shares of common stock.

TABLE OF CONTENTS

PART I – FINANCIAL INFORMATION

ITEM 1. FINANCIAL STATEMENTS
UNIVERSAL DISPLAY CORPORATION AND SUBSIDIARIES

CONSOLIDATED BALANCE SHEETS

(UNAUDITED)

(in thousands, except share and per share data)

	June 30, 2017	December 31, 2016
ASSETS		
CURRENT ASSETS:		
Cash and cash equivalents	$ 109,438	$ 139,365
Short-term investments	256,117	188,644
Accounts receivable	39,702	24,994
Inventory	24,437	17,314
Deferred income taxes	—	8,661
Other current assets	7,191	6,392
Total current assets	436,885	385,370
PROPERTY AND EQUIPMENT, net of accumulated depreciation of $34,409 and $32,167	38,691	27,203
ACQUIRED TECHNOLOGY, net of accumulated amortization of $81,013 and $70,714	141,828	152,127
OTHER INTANGIBLE ASSETS, net of accumulated amortization of $1,303 and $615	15,537	16,225
GOODWILL	15,535	15,535
INVESTMENTS	14,775	14,960
DEFERRED INCOME TAXES	44,067	15,832
OTHER ASSETS	317	307
TOTAL ASSETS	$ 707,635	$ 627,559
LIABILITIES AND SHAREHOLDERS' EQUITY		
CURRENT LIABILITIES:		
Accounts payable	$ 17,772	$ 8,112
Accrued expenses	12,442	19,845
Deferred revenue	10,061	10,282
Other current liabilities	1,146	1,967
Total current liabilities	41,421	40,206
DEFERRED REVENUE	27,174	31,322
RETIREMENT PLAN BENEFIT LIABILITY	31,228	27,563
Total liabilities	99,823	99,091
COMMITMENTS AND CONTINGENCIES (Note 14)		
SHAREHOLDERS' EQUITY:		
Preferred Stock, par value $0.01 per share, 5,000,000 shares authorized, 200,000	2	2

shares of Series A Nonconvertible Preferred Stock issued and outstanding (liquidation value of $7.50 per share or $1,500)		
Common Stock, par value $0.01 per share, 100,000,000 shares authorized, 48,444,492 and 48,270,990 shares issued, and 47,086,629 and 46,913,127 shares outstanding, at June 30, 2017 and December 31, 2016, respectively	484	483
Additional paid-in capital	603,438	604,364
Retained earnings (accumulated deficit)	55,617	(25,557)
Accumulated other comprehensive loss	(11,571)	(10,666)
Treasury stock, at cost (1,357,863 shares at June 30, 2017 and December 31, 2016)	(40,158)	(40,158)
Total shareholders' equity	607,812	528,468
TOTAL LIABILITIES AND SHAREHOLDERS' EQUITY	$707,635	$ 627,559

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

1

UNIVERSAL DISPLAY CORPORATION AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF INCOME

(UNAUDITED)

(in thousands, except share and per share data)

	Three Months Ended June 30, 2017	2016	Six Months Ended June 30, 2017	2016
REVENUE:				
Material sales	$46,828	$22,315	$93,465	$46,619
Royalty and license fees	53,667	42,018	60,692	47,360
Contract research services	2,018	59	3,922	116
Total revenue	102,513	64,392	158,079	94,095
COST OF SALES	11,310	5,684	24,297	10,736
Gross margin	91,203	58,708	133,782	83,359
OPERATING EXPENSES:				
Research and development	10,685	10,969	22,503	21,445
Selling, general and administrative	9,839	7,688	19,916	14,264
Amortization of acquired technology and other intangible assets	5,495	2,830	10,987	5,579
Patent costs	1,674	1,230	3,221	2,575
Royalty and license expense	2,991	1,966	4,578	2,841
Total operating expenses	30,684	24,683	61,205	46,704
OPERATING INCOME	60,519	34,025	72,577	36,655
Interest income, net	796	653	1,467	978
Other income (expense), net	6	(1,829)	(13)	(1,914)
Interest and other income, net	802	(1,176)	1,454	(936)
INCOME BEFORE INCOME TAXES	61,321	32,849	74,031	35,719
INCOME TAX EXPENSE	(14,134)	(11,047)	(16,479)	(11,968)
NET INCOME	$47,187	$21,802	$57,552	$23,751
NET INCOME PER COMMON SHARE:				
BASIC	$0.99	$0.46	$1.21	$0.51
DILUTED	$0.99	$0.46	$1.21	$0.51
WEIGHTED AVERAGE SHARES USED IN COMPUTING NET INCOME PER COMMON SHARE:				
BASIC	46,742,746	46,927,543	46,702,376	46,862,199
DILUTED	46,810,238	47,041,854	46,781,120	46,985,374
CASH DIVIDENDS DECLARED PER COMMON SHARE	$0.03	$—	$0.06	$—

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

2

UNIVERSAL DISPLAY CORPORATION AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME

(UNAUDITED)

(in thousands)

	Three Months Ended June 30,		Six Months Ended June 30,	
	2017	2016	2017	2016
NET INCOME	$47,187	$21,802	$57,552	$23,751
OTHER COMPREHENSIVE INCOME (LOSS), NET OF TAX:				
Unrealized gain (loss) on available-for-sale securities, net of tax of $58, $37, $50 and $47, respectively	105	67	90	(84)
Employee benefit plan:				
Actuarial (loss) gain, net of tax of $906, $271, $906 and $200, respectively	(1,662)	479	(1,662)	(353)
Amortization of prior service cost and actuarial loss for retirement plan included in net periodic pension costs, net of tax of $187, $142, $350 and $302, respectively	343	254	642	535
Net change for employee benefit plan	(1,319)	733	(1,020)	182
Change in cumulative foreign currency translation adjustment	(5)	20	25	20
TOTAL OTHER COMPREHENSIVE (LOSS) INCOME	(1,219)	820	(905)	118
COMPREHENSIVE INCOME	$45,968	$22,622	$56,647	$23,869

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

UNIVERSAL DISPLAY CORPORATION AND SUBSIDIARIES

CONSOLIDATED STATEMENT OF SHAREHOLDERS' EQUITY

(UNAUDITED)

(in thousands, except for share data)

	Series A Nonconvertible Preferred Stock		Common Stock		Additional		Accumulated Other	Treasury Stock		Total
	Shares	Amount	Shares	Amount	Paid-in Capital	Retained Earnings	Comprehensive Loss	Shares	Amount	Shareholders' Equity
BALANCE, DECEMBER 31, 2016	200,000	$2	48,270,990	$483	$604,364	$(25,557)	$(10,666)	1,357,863	$(40,158)	$528,468
Cumulative effect of recording excess tax benefits from share-based payment arrangements	—	—	—	—	—	26,450	—	—	—	26,450
Net income	—	—	—	—	—	57,552	—	—	—	57,552
Other comprehensive income	—	—	—	—	—	—	(905)	—	—	(905)
Cash dividend	—	—	—	—	—	(2,828)	—	—	—	(2,828)
Exercise of common stock options	—	—	1,750	—	28	—	—	—	—	28
Issuance of common stock to employees	—	—	242,175	1	5,469	—	—	—	—	5,470
Shares withheld for employee taxes	—	—	(101,165)	—	(8,501)	—	—	—	—	(8,501)
Issuance of common stock to Board of Directors and Scientific Advisory Board	—	—	24,814	—	1,628	—	—	—	—	1,628
	—	—	5,928	—	450	—	—	—	—	450

Issuance of common stock to employees under an ESPP										
BALANCE, JUNE 30, 2017	200,000	$2	48,444,492	$484	$603,438	$55,617	$(11,571)	1,357,863	$(40,158)	$607,812

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

UNIVERSAL DISPLAY CORPORATION AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF CASH FLOWS

(UNAUDITED)

(in thousands)

	Six Months Ended June 30, 2017	2016
CASH FLOWS FROM OPERATING ACTIVITIES:		
Net income	$57,552	$23,751
Adjustments to reconcile net income to net cash provided by operating activities:		
Amortization of deferred revenue	(4,873)	(3,601)
Depreciation	2,398	1,839
Amortization of intangibles	10,987	5,579
Amortization of premium and discount on investments, net	(1,260)	(801)
Stock-based compensation to employees	5,404	5,401
Stock-based compensation to Board of Directors and Scientific Advisory Board	1,328	891
Change in earnout liability recorded for Adesis acquisition	469	—
Deferred income tax expense	7,408	4,826
Retirement plan expense	2,088	1,982
Decrease (increase) in assets:		
Accounts receivable	(14,708)	6,745
Inventory	(7,123)	(3,719)
Other current assets	(799)	(3,174)
Other assets	(10)	(369)
Increase (decrease) in liabilities:		
Accounts payable and accrued expenses	(1,916)	(5,625)
Other current liabilities	(821)	256
Deferred revenue	505	2,250
Net cash provided by operating activities	56,629	36,231
CASH FLOWS FROM INVESTING ACTIVITIES:		
Purchases of property and equipment	(9,717)	(2,162)
Purchases of intangibles	—	(96,033)
Purchases of investments	(255,224)	(325,226)
Proceeds from sale of investments	189,335	364,017
Net cash used in investing activities	(75,606)	(59,404)
CASH FLOWS FROM FINANCING ACTIVITIES:		
Proceeds from issuance of common stock	349	202
Proceeds from the exercise of common stock options	30	182
Payment of withholding taxes related to stock-based compensation to employees	(8,501)	(4,794)
Cash dividends paid	(2,828)	—
Net cash used in financing activities	(10,950)	(4,410)
DECREASE IN CASH AND CASH EQUIVALENTS	(29,927)	(27,583)
CASH AND CASH EQUIVALENTS, BEGINNING OF PERIOD	139,365	97,513

CASH AND CASH EQUIVALENTS, END OF PERIOD	$109,438	$69,930
The following non-cash activities occurred:		
Unrealized gain (loss) on available-for-sale securities	$140	$(131)
Common stock issued to Board of Directors and Scientific Advisory Board that was earned and accrued for in a previous period	300	300
Common stock issued to employees that was earned and accrued for in a previous period	174	1,105
Net change in accounts payable and accrued expenses related to purchases of property and equipment	4,169	(120)

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

UNIVERSAL DISPLAY CORPORATION AND SUBSIDIARIES

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

(UNAUDITED)

1. BUSINESS:

Universal Display Corporation (the Company) is a leader in the research, development and commercialization of organic light emitting diode (OLED) technologies and materials for use in display and solid-state lighting applications. OLEDs are thin, lightweight and power-efficient solid-state devices that emit light that can be manufactured on both flexible and rigid substrates, making them highly suitable for use in full-color displays and as lighting products. OLED displays are capturing a growing share of the display market. The Company believes this is because OLEDs offer potential advantages over competing display technologies with respect to power efficiency, contrast ratio, viewing angle, video response time, form factor and manufacturing cost. The Company also believes that OLED lighting products have the potential to replace many existing light sources in the future because of their high power efficiency, excellent color rendering index, low operating temperature and novel form factor. The Company's technology leadership and intellectual property position should enable it to share in the revenues from OLED displays and lighting products as they enter mainstream consumer and other markets.

The Company's primary business strategy is to (1) further develop and license its proprietary OLED technologies to manufacturers of products for display applications, such as mobile phones, televisions, tablets, wearables, portable media devices, notebook computers, personal computers, and automotive interiors, and specialty and general lighting products; and (2) develop new OLED materials and sell existing and any new materials to those product manufacturers. The Company has established a significant portfolio of proprietary OLED technologies and materials, primarily through internal research and development efforts and acquisitions of patents and patent applications, as well as maintaining its relationships with world-class partners such as Princeton University (Princeton), the University of Southern California (USC), the University of Michigan (Michigan) and PPG Industries, Inc. (PPG Industries). The Company currently owns, exclusively licenses or has the sole right to sublicense more than 4,200 patents issued and pending worldwide.

The Company sells its proprietary OLED materials to customers for evaluation and use in commercial OLED products. The Company also enters into agreements with manufacturers of OLED display and lighting products under which it grants them licenses to practice under its patents and to use the Company's proprietary know-how. At the same time, the Company works with these and other companies who are evaluating the Company's OLED technologies and materials for possible use in commercial OLED display and lighting products.

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES:

Interim Financial Information

In the opinion of management, the accompanying unaudited consolidated financial statements contain all adjustments (consisting of only normal recurring adjustments) necessary to present fairly the Company's financial position as of June 30, 2017 and results of operations for the three and six months ended June 30, 2017 and 2016, and cash flows for the six months ended June 30, 2017 and 2016. While management believes that the disclosures presented are adequate to make the information not misleading, these unaudited consolidated financial statements should be read in conjunction with the audited consolidated financial statements and the notes thereto in the Company's latest year-end financial statements, which are included in the Company's Annual Report on Form 10-K for the year ended December 31, 2016. The results of the Company's operations for any interim period are not necessarily indicative of the results of operations for any other interim period or for the full year.

Principles of Consolidation

The consolidated financial statements include the accounts of Universal Display Corporation and its wholly owned subsidiaries, UDC, Inc., UDC Ireland Limited, Universal Display Corporation Hong Kong, Limited, Universal Display Corporation Korea, Y.H., Universal Display Corporation Japan GK, Universal Display Corporation China, Ltd. and Adesis, Inc. (Adesis). All intercompany transactions and accounts have been eliminated.

Business Combinations

Accounting for acquisitions requires the Company to recognize separately from goodwill the assets acquired and the liabilities assumed at the acquisition date fair values. Goodwill as of the acquisition date is measured as the excess of consideration transferred over the net of the acquisition date fair values of the assets acquired and the liabilities assumed. While the Company uses its best estimates and assumptions to accurately value assets acquired and liabilities assumed at the acquisition date as well as contingent consideration, where applicable, the estimates are inherently uncertain and subject to refinement. As a result, during the measurement period, which may be up to one year from the acquisition date, adjustments may be recorded to the assets acquired and liabilities assumed with the corresponding offset to goodwill. Upon the conclusion of the measurement period or final determination of the values of assets acquired or liabilities assumed, whichever comes first, any subsequent adjustments are recorded to the consolidated statements of income.

Management’s Use of Estimates

The preparation of financial statements in conformity with U.S. generally accepted accounting principles (GAAP) requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. The estimates made are principally in the areas of revenue recognition for license agreements, the useful life of acquired intangibles, the use and recoverability of inventories, intangibles and income taxes including realization of deferred tax assets, stock-based compensation and retirement benefit plan liabilities. Actual results could differ from those estimates.

Inventories

Inventories consist of raw materials, work-in-process and finished goods, including inventory consigned to customers, and are stated at the lower of cost, determined on a first-in, first-out basis, or market. Inventory valuation and firm committed purchase order assessments are performed on a quarterly basis and those items that are identified to be obsolete or in excess of forecasted usage are written down to their estimated realizable value. Estimates of realizable value are based upon management’s analyses and assumptions, including, but not limited to, forecasted sales levels by product, expected product lifecycle, product development plans and future demand requirements. A 12-month rolling forecast based on factors, including, but not limited to, production cycles, anticipated product orders, marketing forecasts, backlog, and shipment activities is used in the inventory analysis. If market conditions are less favorable than forecasts or actual demand from customers is lower than estimates, additional inventory write-downs may be required. If demand is higher than expected, inventories that had previously been written down may be sold.

Certain of the Company’s customers have assumed the responsibility for maintaining the Company's inventory at their location based on the customers’ demand forecast. Notwithstanding the fact that the Company builds and ships the inventory, the customer does not purchase the consigned inventory until the inventory is drawn or pulled by the customer to be used in the manufacture of the customer’s product. Though the consigned inventory may be at the customer’s physical location, it remains inventory owned by the Company until the inventory is drawn or pulled, which is the time at which the sale takes place.

Fair Value of Financial Instruments

The carrying values of accounts receivable, other current assets, and accounts payable approximate fair value in the accompanying financial statements due to the short-term nature of those instruments. The Company’s other financial instruments, which include cash equivalents and investments, are carried at fair value.

Revenue Recognition and Deferred Revenue

Material sales relate to the Company’s sale of its OLED materials for incorporation into its customers’ commercial OLED products or for their OLED development and evaluation activities. Material sales are recognized at the time title passes, which is typically at the time of shipment or at the time of delivery, depending upon the contractual agreement between the parties.

The Company receives license and royalty payments under certain commercial, development and technology evaluation agreements, some of which are non-refundable. These payments may include royalty and license fees made pursuant to license agreements and certain commercial supply agreements. Amounts received are deferred and classified as either current or non-current deferred revenue based upon current contractual remaining terms; however, based upon on-going relationships with customers, as well as future agreement extensions and other factors, amounts classified as current as of June 30, 2017 may not be recognized as revenue over the next twelve months. For arrangements with extended payment terms where the fee is not fixed and determinable, the Company recognizes revenue when the payment is due and payable. Royalty revenue and license fees included as part of commercial supply agreements are recognized when earned and the amount is fixed and determinable. If the Company used different estimates for the useful life of the licensed technology, or if fees are fixed and determinable, reported revenue during the relevant period would differ.

Contract research services revenue is revenue earned by performing organic and organometallic synthetics research, development and commercialization on a contractual basis. These services range from intermediates for structure-activity relationship studies, reference agents and building blocks for combinatorial synthesis, re-synthesis of key intermediates, specialty organic chemistry needs, and selective toll manufacturing. These services are provided to third-party pharmaceutical and life sciences firms and other technology firms at fixed costs or on an annual contract basis. Revenue is recognized as services are performed with billing schedules and payment terms negotiated on a contract-by-contract basis. Payments received in excess of revenue recognized are recorded as deferred revenue. In other cases, services may be provided and revenue is recognized before the client is invoiced. In these cases, revenue recognized will exceed amounts billed and the difference, representing amounts which are currently unbillable to the customer pursuant to contractual terms, is recorded as an unbilled receivable.

Technology development and support revenue is revenue earned from government contracts, development and technology evaluation agreements and commercialization assistance fees, which includes reimbursements by government entities for all or a portion of the research and development costs the Company incurs in relation to its government contracts. Revenues are recognized proportionally as research and development costs are incurred, or as defined milestones are achieved, and are included in contract research services in the accompanying consolidated statements of income.

Currently, the Company's most significant commercial license agreement, which runs through the end of 2017, is with Samsung Display Co., Ltd. (SDC) and covers the manufacture and sale of specified OLED display products. Under this agreement, the Company is being paid a license fee, payable in semi-annual installments over the agreement term of 6.4 years. The installments, which are due in the second and fourth quarter of each year, increase on an annual basis over the term of the agreement. The agreement conveys to SDC the non-exclusive right to use certain of the Company's intellectual property assets for a limited period of time that is less than the estimated life of the assets. Ratable recognition of revenue is impacted by the agreement's extended increasing payment terms in light of the Company's limited history with similar agreements. As a result, revenue is recognized at the lesser of the proportional performance approach (ratable) and the amount of due and payable fees from SDC. Given the increasing contractual payment schedule, license fees under the agreement are recognized as revenue when they become due and payable, which is currently scheduled to be in the second and fourth quarter of each year.

At the same time the Company entered into the current patent license agreement with SDC, the Company also entered into a new supplemental material purchase agreement with SDC. Under the current supplemental material purchase agreement, SDC agrees to purchase from the Company a minimum dollar amount of phosphorescent emitter materials for use in the manufacture of licensed products. This minimum purchase commitment is subject to SDC’s requirements for phosphorescent emitter materials and the Company’s ability to meet these requirements over the term of the supplemental agreement. The minimum purchase amounts increase on an annual basis over the term of the supplemental agreement. These amounts were determined through negotiation based on a number of factors, including, without limitation, estimates of SDC’s OLED business growth as a percentage of published OLED market forecasts and SDC’s projected minimum usage of red and green phosphorescent emitter materials over the term of the agreement.

In 2015, the Company entered into an OLED patent license agreement and an OLED commercial supply agreement with LG Display Co., Ltd. (LG Display) which were effective as of January 1, 2015 and superseded the 2007 commercial supply agreement between the parties. The new agreements have a term that is set to expire by the end of 2022. The patent license agreement provides LG Display a non-exclusive, royalty bearing portfolio license to make and sell OLED displays under the Company's patent portfolio. The patent license calls for license fees, prepaid royalties and running royalties on licensed products. The prepaid royalty amount is included in deferred revenue and a portion of this amount can be credited against total royalties due over the life of the contract. The agreements include customary provisions relating to warranties, indemnities, confidentiality, assignability and business terms. The agreements provide for certain other minimum obligations relating to the volume of material sales anticipated over the term of the agreements, as well as minimum royalty revenue to be generated under the patent license agreement. The

Company expects to generate revenue under these agreements that are predominantly tied to LG Display's sales of OLED licensed products. The OLED commercial supply agreement provides for the sale of materials for use by LG Display, which may include phosphorescent dopants and host materials.

In 2016, the Company entered into an OLED Technology License Agreement and Commercial Material Supply Agreement with Tianma Micro-electronics Co., Ltd. (Tianma) which were both effective July 21, 2016 and run for five years. Under the license agreement, the Company has granted Tianma non-exclusive license rights under various patents owned or controlled by the Company to manufacture and sell OLED display products. The license agreement calls for license fees and running royalties on licensed products. Additionally, the agreement provides for the sale of phosphorescent OLED materials to Tianma for use in its licensed products.

The Company records taxes billed to customers and remitted to various governmental entities on a gross basis in both revenues and cost of material sales in the consolidated statements of income. The amounts of these pass through taxes reflected in revenues and cost of material sales were $151,000 and $207,000 for the three and six months ended June 30, 2017, respectively, and $13,000 and $69,000 for the three and six months ended June 30, 2016, respectively.

All sales transactions are billed and due within 90 days and substantially all are transacted in U.S. dollars.

Cost of Sales

Cost of sales consists of labor and material costs associated with the production of materials processed at the Company's manufacturing partners and at the Company's internal manufacturing processing facility. The Company’s portion of cost of sales also includes depreciation of manufacturing equipment, as well as manufacturing overhead costs and inventory adjustments for excess and obsolete inventory.

Research and Development

Expenditures for research and development are charged to expense as incurred.

Patent Costs

Costs associated with patent applications, patent prosecution, patent defense and the maintenance of patents are charged to expense as incurred. Costs to successfully defend a challenge to a patent are capitalized to the extent of an evident increase in the value of the patent. Costs that relate to an unsuccessful outcome are charged to expense.

Amortization of Acquired Technology

Amortization costs relate to technology acquired from BASF, Fujifilm and Motorola. These acquisitions were completed in the years ended December 31, 2016, 2012 and 2011, respectively. Acquisition costs are being amortized over a period of 10 years for the BASF and Fujifilm patents and 7.5 years for the Motorola patents.

Amortization of Other Intangible Assets

Other intangible assets from the Adesis acquisition are being amortized over a period of 10 to 15 years. See Note 7 for further discussion.

Translation of Foreign Currency Financial Statements and Foreign Currency Transactions

The Company's reporting currency is the U.S. dollar. The functional currency for the Company's Ireland subsidiary is also the U.S. dollar and the functional currency for each of the Company's Asia-Pacific foreign subsidiaries is its local currency. The Company translates the amounts included in the consolidated statements of income from its Asia-Pacific foreign subsidiaries into U.S. dollars at weighted-average exchange rates, which the Company believes are representative of the actual exchange rates on the dates of the transactions. The Company's foreign subsidiaries' assets and liabilities are translated into U.S. dollars from the local currency at the actual exchange rates as of the end of each reporting date, and the Company records the resulting foreign exchange translation adjustments in the consolidated balance sheets as a component of accumulated other comprehensive loss. The overall effect of the translation of foreign currency and foreign currency transactions to date has been insignificant.

Income Taxes

Income taxes are accounted for under the asset and liability method. Deferred tax assets and liabilities are recognized for the future tax consequences attributable to differences between the financial statement carrying amounts of existing assets and liabilities and their respective tax bases and operating loss and tax credit carryforwards. Deferred tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in the years in which those temporary differences are expected to be recovered or settled. The effect on deferred tax assets and liabilities of a change in tax rates is recognized in income in the period that includes the enactment date. The Company recognizes the effect of income tax positions only if those positions are more likely than not of being sustained. Recognized income tax positions are measured at the largest amount of which the likelihood of realization is greater than 50%. Changes in recognition or measurement are reflected in the period in which the change in judgment occurs. The Company records interest and penalties, if any, related to unrecognized tax benefits as a component of tax expense.

Share-Based Payment Awards

The Company recognizes in the consolidated statements of income the grant-date fair value of equity based awards such as shares issued under employee stock purchase plans, restricted stock awards, restricted stock units and performance unit awards issued to employees and directors.

The grant-date fair value of stock awards is based on the closing price of the stock on the date of grant. The fair value of share-based awards is recognized as compensation expense on a straight-line basis over the requisite service period, net of forfeitures. The Company issues new shares upon the respective grant, exercise or vesting of the share-based payment awards, as applicable.

Performance unit awards are subject to either a performance-based or market-based vesting requirement. For performance-based vesting, the grant-date fair value of the award, based on fair value of the Company's common stock, is recognized over the service period based on an assessment of the likelihood that the applicable performance goals will be achieved and compensation expense is periodically adjusted based on actual and expected performance. Compensation expense for performance unit awards with market-based vesting is calculated based on the estimated fair value as of the grant date utilizing a Monte Carlo simulation model and is recognized over the service period on a straight-line basis.

Recent Accounting Pronouncements

In May 2014, the Financial Accounting Standards Board (FASB) issued a new revenue recognition standard entitled Revenue from Contracts with Customers. The objective of the standard is to establish the principles that an entity shall apply to report useful information to users of financial statements about the nature, amount, timing, and uncertainty of revenue and cash flows from a contract with a customer. The standard is effective for annual reporting periods beginning after December 15, 2017. Earlier adoption as of the original date is optional; however, the Company will adopt the standard beginning January 1, 2018. The standard allows for either “full retrospective” adoption, meaning the standard is applied to all periods presented, or “modified retrospective” adoption, meaning the standard is applied only to the most current period presented in the financial statements. The Company is currently analyzing the impact of the new standard on the Company’s revenue contracts, comparing its current accounting policies and practices to the requirements of the new standard, and identifying potential differences that would result from applying the new standard to its contracts. The Company plans to use the “modified retrospective” adoption method. The Company’s most significant license contract expires at the end of 2017 and is anticipated for renewal as of January 1, 2018. As such, the renewed contract will be accounted for in accordance with the new revenue recognition standard. The Company is also identifying and implementing changes to the Company’s business processes, systems and controls to support adoption of the new standard in 2018.

In November 2015, the FASB issued ASU No. 2015-17, Balance Sheet Classification of Deferred Taxes, which requires the classification of all deferred tax assets and liabilities as noncurrent rather than separately disclosing deferred taxes as current and noncurrent. The standard is effective for annual reporting periods beginning after December 15, 2016. The standard allows for either “prospective” adoption, meaning the standard is applied to the most current period presented in the financial statements or “full retrospective” adoption, meaning the standard is applied to all periods presented. The Company adopted ASU 2015-17 effective January 1, 2017 on a “prospective” basis.

In February 2016, the FASB issued ASU No. 2016-02, Leases, which addresses the classification and recognition of lease assets and liabilities formerly classified as operating leases under generally accepted accounting principles. The guidance will address certain aspects of recognition and measurement, and quantitative and qualitative aspects of presentation and disclosure. The guidance is effective for fiscal years beginning after December 31, 2018, including interim periods within those fiscal years. The Company is evaluating the effect that ASU 2016-02 may have on its consolidated financial statements and related disclosures.

In March 2016, the FASB issued ASU No. 2016-09, Improvements to Employee Share-Based Accounting. The objective of the standard is to simplify the accounting and related disclosures associated with employee share-based accounting. The standard is effective for annual reporting periods beginning after December 15, 2016. The ASU requires prospective adoption, meaning the standard is applied to the most current period presented in the financial statements. The Company adopted ASU 2016-09 effective January 1, 2017 and recorded a deferred tax asset and offsetting credit to retained earnings of $26.5 million (see Note 10).

In August 2016, the FASB issued ASU No. 2016-15, Statement of Cash Flows (Topic 230): Classification of Certain Cash Receipts and Cash Payments. The objective of the standard is to reduce diversity in practice in how certain transactions are classified in the statement of cash flows. The ASU provides additional clarification guidance on the classification of certain cash receipts and payments in the statement of cash flows. The new guidance is effective for fiscal years and interim periods within those years beginning after December 15, 2017, with early adoption permitted. The Company is evaluating the effect that ASU 2016-15 may have on its consolidated financial statements and related disclosures.

In October 2016, the FASB issued ASU No. 2016-16, Income Taxes (Topic 740): Intra-Entity Transfers of Assets Other Than Inventory. ASU 2016-16 clarifies the accounting for the current and deferred income taxes for an intra-entity transfer of an asset other than inventory. ASU 2016-16 is effective for fiscal years beginning after December 15, 2017, including interim periods within those fiscal years, with early adoption permitted. The Company is evaluating the effect that ASU 2016-16 may have on its consolidated financial statements and related disclosures.

In January 2017, the FASB issued ASU No. 2017-04, Intangibles – Goodwill and Other (Topic 350): Simplifying the Test of Goodwill Impairment eliminating the requirement to calculate the implied fair value, essentially eliminating step two from the goodwill impairment test. The new standard requires goodwill impairment to be based upon the results of step one of the impairment test, which is defined as the excess of the carrying value of a reporting unit over its fair value. The impairment charge will be limited to the amount of goodwill allocated to that reporting unit. The standards update is effective prospectively for annual and interim goodwill impairment testing performed in fiscal years beginning after December 15, 2019, with early adoption permitted. The Company is evaluating the effect that ASU 2017-04 may have on its consolidated financial statements and related disclosures.

In May 2017, the FASB issued ASU 2017-09, Compensation – Stock Compensation (Topic 718): Scope of Modification Accounting. ASU 2017-09 clarifies which changes to the terms or conditions of a share-based payment award require an entity to apply modification accounting, in accordance with Topic 718. The guidance is effective for annual periods beginning after December 15, 2017, with early adoption permitted, and requires a prospective application to awards modified on or after the adoption date. The Company has not historically made changes to the terms or conditions of shared-based payment awards and does not expect adoption of ASU 2017-09 to have a material impact on the consolidated financial statements and related disclosures.

3. BUSINESS COMBINATIONS:

On June 23, 2016, the Company entered into an agreement to acquire Adesis, a privately held contract research organization (CRO) with 43 employees specializing in organic and organometallic synthetic research, development, and commercialization. Adesis is a technology vendor to companies in the pharmaceutical, fine chemical, biomaterials, and catalyst industries, and has worked with the Company over the last few years to help advance and accelerate a number of the Company’s product offerings. The transaction closed on July 11, 2016. Under the terms of the agreement, the Company’s subsidiary, UDC, Inc., acquired all outstanding shares of Adesis in a merger for $33.9 million in cash, and up to an additional $2.4 million in cash contingent upon Adesis’ achievement of certain milestones within two years of the acquisition. The acquisition was funded through use of existing cash and investments.

Preliminary Purchase Price Allocation

The Company accounted for Adesis using the acquisition method of accounting in accordance with applicable U.S. GAAP whereby the total purchase price was allocated to tangible and intangible assets acquired and liabilities assumed based on respective fair values. The contingent consideration arrangement requires the Company to pay up to $1.2 million of additional consideration to the former shareholders of Adesis if revenues exceed certain threshold levels at the end of each twelve-month period ending December 31, 2016 and December 31, 2017. For the year ended December 31, 2016, the additional cash consideration earned by the former shareholders of Adesis was $1.2 million. The fair value of the contingent consideration was derived using a Monte Carlo simulation model based on management’s projections of future revenue levels. The following table summarizes the values of the assets acquired and liabilities assumed at the date of acquisition (in thousands):

Cash consideration	$33,872
Contingent consideration	1,670
	$35,542
Allocation of purchase price:	

Current assets, including cash of $492	$2,204
Property and equipment	1,869
Accounts payable and accrued liabilities	(906)
Net tangible assets	3,167
Identifiable intangible assets	16,840
Goodwill	15,535
Total purchase price	$35,542

The purchase price exceeded the fair value of the net tangible assets and identifiable intangible assets acquired and, as a result, the Company recorded goodwill in connection with this transaction. This difference includes a going concern element that represents the Company’s ability to earn a higher rate of return on this group of assets than would be expected on the separate assets as determined during the valuation process.

Transaction costs of $360,000 were recorded and charged to selling, general and administrative expense on the accompanying consolidated statements of operations during 2016.

Intangible Assets Identified

The following table presents the intangible assets identified in the transaction:

Category	Estimated fair value (in thousands)	Estimated useful life (in years)
Customer relationships	10,520	11.5
Internally-developed IP, processes and recipes	4,820	15.0
Trade name/Trademarks	1,500	10.0
Total identifiable intangible assets	$ 16,840	

The preliminary fair value of the customer relationships asset was determined using the income approach through an excess earnings analysis which estimates value based on the present value of future economic benefits. The customer relationships intangible asset represents relationships between Adesis and its customers. The fair value of the internally-developed IP, processes and recipes was determined by utilizing the relief-from-royalty methodology. The preliminary fair value of the Adesis trade name asset was determined using the income approach through a relief-from-royalty analysis. The determination of useful lives was based upon consideration of market participant assumptions and transaction specific factors.

4. CASH, CASH EQUIVALENTS AND INVESTMENTS:

The Company considers all highly liquid debt instruments purchased with an original maturity of three months or less to be cash equivalents. The Company classifies its remaining investments as available-for-sale. These securities are carried at fair market value, with unrealized gains and losses reported in shareholders' equity. Gains or losses on securities sold are based on the specific identification method. Investments as of June 30, 2017 and December 31, 2016 consisted of the following (in thousands):

Investment Classification	Amortized Cost	Unrealized Gains	(Losses)	Aggregate Fair Market Value
June 30, 2017				
Certificates of deposit	$ 1,770	$ 1	$ (1)	$ 1,770
Commercial paper	3,994	—	(1)	3,993
Corporate bonds	195,542	14	(242)	195,314
U.S. Government bonds	73,809	4	(6)	73,807
	$ 275,115	$ 19	$ (250)	$ 274,884
December 31, 2016				
Certificates of deposit	$ 3,362	$ 3	$ —	$ 3,365
Commercial paper	2,998	—	(2)	2,996

Corporate bonds	209,595	6	(377)	209,224
U.S. Government bonds	32,996	1	(3)	32,994
	$ 248,951	$ 10	$ (382)	$ 248,579

At June 30, 2017, commercial paper of $4.0 million was included in cash equivalents in the consolidated balance sheet.

5. FAIR VALUE MEASUREMENTS:

The following table provides the assets and liabilities carried at fair value measured on a recurring basis as of June 30, 2017 (in thousands):

		Fair Value Measurements, Using		
	Total carrying value as of June 30, 2017	Quoted prices in active markets (Level 1)	Significant other observable inputs (Level 2)	Significant unobservable inputs (Level 3)
Cash equivalents	$ 27,358	$ 27,358	$ —	$ —
Short-term investments	256,117	256,117	—	—
Long-term investments	14,775	14,775	—	—

The following table provides the assets and liabilities carried at fair value measured on a recurring basis as of December 31, 2016 (in thousands):

	Total carrying value as of December 31, 2016	Fair Value Measurements, Using Quoted prices in active markets (Level 1)	Significant other observable inputs (Level 2)	Significant unobservable inputs (Level 3)
Cash equivalents	$ 71,773	$ 71,773	$ —	$ —
Short-term investments	188,644	188,644	—	—
Long-term investments	14,960	14,960	—	—

Level 1 inputs are quoted prices (unadjusted) in active markets for identical assets or liabilities. Level 2 inputs are quoted prices for similar assets and liabilities in active markets or inputs that are observable for the asset or liability, either directly or indirectly through market corroboration, for substantially the full term of the financial instrument. Level 3 inputs are unobservable inputs based on management’s own assumptions used to measure assets and liabilities at fair value. A financial asset’s or liability’s classification is determined based on the lowest level input that is significant to the fair value measurement.

Changes in fair value of the investments are recorded as unrealized gains and losses in other comprehensive income. If a decline in fair value of an investment is deemed to be other than temporary, the cost of the Company’s investment will be written down by the amount of the other-than-temporary impairment with a resulting charge to net income. There were no other-than-temporary impairments of investments as of June 30, 2017 or December 31, 2016.

6. INVENTORY:

Inventory consisted of the following (in thousands):

	June 30, 2017	December 31, 2016
Raw materials	$8,992	$ 6,539
Work-in-process	6,489	3,719
Finished goods	8,956	7,056
Inventory	$24,437	$ 17,314

7. GOODWILL AND INTANGIBLE ASSETS:

The Company monitors the recoverability of goodwill annually or whenever events or changes in circumstances indicate the carrying value may not be recoverable. Purchased intangible assets subject to amortization consist primarily of acquired technology and other intangible assets that include trade names, customer relationships and internally developed IP processes.

Acquired Technology

Acquired technology consists of acquired license rights for patents and know-how obtained from PD-LD, Inc., Motorola, BASF SE (BASF) and Fujifilm. These intangible assets consist of the following (in thousands):

	June 30, 2017
PD-LD, Inc.	$ 1,481
Motorola	15,909
BASF	95,989
Fujifilm	109,462
	222,841
Less: Accumulated amortization	(81,013)
Acquired technology, net	$ 141,828

Amortization expense related to acquired technology was $5.1 million and $2.8 million for the three months ended June 30, 2017 and 2016, respectively, and $10.3 million and $5.6 million for the six months ended June 30, 2017 and 2016, respectively. Amortization expense is included in amortization of acquired technology and other intangible assets expense line item on the Consolidated Statements of Income and is expected to be $20.6 million for each of the next five fiscal years.

Motorola Patent Acquisition

In 2000, the Company entered into a royalty-bearing license agreement with Motorola whereby Motorola granted the Company perpetual license rights to what are now 74 issued U.S. patents relating to Motorola's OLED technologies, together with foreign counterparts in various countries. These patents will all expire in the U.S. by 2018.

On March 9, 2011, the Company purchased these patents from Motorola, including all existing and future claims and causes of action for any infringement of the patents, pursuant to a Patent Purchase Agreement. The Patent Purchase Agreement effectively terminated the Company's license agreement with Motorola, including any obligation to make royalty payments to Motorola. The technology acquired from Motorola is being amortized over a period of 7.5 years.

Fujifilm Patent Acquisition

On July 23, 2012, the Company entered into a Patent Sale Agreement with Fujifilm. Under the agreement, Fujifilm sold more than 1,200 OLED-related patents and patent applications in exchange for a cash payment of $105.0 million, plus costs incurred in connection with the purchase. The agreement contains customary representations and warranties and covenants, including respective covenants not to sue by both parties thereto. The agreement permitted the Company to assign all of its rights and obligations under the agreement to its affiliates, and the Company assigned, prior to the consummation of the transactions contemplated by the agreement, its rights and obligations to UDC Ireland Limited (UDC Ireland), a wholly-owned subsidiary of the Company formed under the laws of the Republic of Ireland. The transactions contemplated by the agreement were consummated on July 26, 2012. The Company recorded the $105.0 million plus $4.5 million of purchase costs as acquired technology, which is being amortized over a period of 10 years.

BASF Patent Acquisition

On June 28, 2016, UDC Ireland entered into and consummated an IP Transfer Agreement with BASF. Under the IP Transfer Agreement, BASF sold to UDC Ireland all of its rights, title and interest to certain of its owned and co-owned intellectual property rights relating to the composition of, development, manufacture and use of OLED materials, including OLED lighting and display stack technology, as well as certain tangible assets. The intellectual property includes knowhow and more than 500 issued and pending patents in the area of phosphorescent materials and technologies. These assets were acquired in exchange for a cash payment of €86.8 million ($95.8 million). In addition, UDC Ireland also took on certain rights and obligations under three joint research and development agreements to which BASF was a party. The IP Transfer Agreement also contains customary representations, warranties and covenants of the parties. UDC Ireland recorded the payment of €86.8 million ($95.8 million) and acquisition costs incurred of $217,000 as acquired technology which is being amortized over a period of 10 years.

Other Intangible Assets

As a result of the Adesis acquisition, the Company recorded $16.8 million of other intangible assets, including $10.5 million assigned to customer relationships with a weighted average life of 11.5 years, $4.8 million of internally developed IP, processes and recipes with a weighted average life of 15 years, and $1.5 million assigned to trade name and trademarks with a weighted average life of 10 years.

	Gross Carrying	Accumulated Amortization	Net Carrying

	Amount		Amount
Customer relationships	$ 10,520	$ (854)	$ 9,666
Internally-developed IP, processes and recipes	4,820	(307)	4,513
Trade name/Trademarks	1,500	(142)	1,358
Total identifiable intangible assets	$ 16,840	$ (1,303)	$ 15,537

Amortization expense related to other intangible assets was $346,000 and none for the three months ended June 30, 2017 and 2016, respectively, and $688,000 and none for the six months ended June 30, 2017 and 2016, respectively. Amortization expense is included in the amortization of acquired technology and other intangible assets expense line item on the Consolidated Statements of Income and is expected to be $1.4 million in 2017 and in each of the four subsequent fiscal years.

8. RESEARCH AND LICENSE AGREEMENTS WITH PRINCETON UNIVERSITY, UNIVERSITY OF SOUTHERN CALIFORNIA AND THE UNIVERSITY OF MICHIGAN:

The Company funded OLED technology research at Princeton University and, on a subcontractor basis, at the University of Southern California for 10 years under a Research Agreement executed with Princeton University in August 1997 (the 1997 Research Agreement). The principal investigator conducting work under the 1997 Research Agreement transferred to the University of Michigan in January 2006. Following this transfer, the 1997 Research Agreement was allowed to expire on July 31, 2007.

As a result of the transfer, the Company entered into a new Sponsored Research Agreement with the University of Southern California to sponsor OLED technology research and, on a subcontractor basis, with the University of Michigan. This new Sponsored Research Agreement (as amended, the 2006 Research Agreement) was effective as of May 1, 2006 and had an original term of three years. On May 1, 2009, the Company amended the 2006 Research Agreement to extend the term of the agreement for an additional four years. The 2006 Research Agreement superseded the 1997 Research Agreement with respect to all work being performed at the University of Southern California and the University of Michigan. Payments under the 2006 Research Agreement were made to the University of Southern California on a quarterly basis as actual expenses were incurred. The Company incurred a total of $5.0 million in research and development expense for work performed under the 2006 Research Agreement during the extended term, which ended on April 30, 2013.

Effective June 1, 2013, the Company amended the 2006 Research Agreement again to extend the term of the agreement for an additional four years. The Company incurred a total of $4.4 million in research and development expense for work performed under the 2006 Research Agreement during the extended term, which ended on April 30, 2017.

Effective May 1, 2017, the Company amended the 2006 Research Agreement once again to extend the term of the agreement for an additional three years. As of June 30, 2017, in connection with this amendment, the Company was obligated to pay the University of Southern California up to $7.1 million for work to be performed during the remaining extended term, which expires April 30, 2020. From May 1, 2017 through June 30, 2017, the Company incurred $50,000 in research and development expense for work performed under the 2006 Research Agreement.

On October 9, 1997, the Company, Princeton University and the University of Southern California entered into an Amended License Agreement (as amended, the 1997 Amended License Agreement) under which Princeton University and the University of Southern California granted the Company worldwide, exclusive license rights, with rights to sublicense, to make, have made, use, lease and/or sell products and to practice processes based on patent applications and issued patents arising out of work performed by Princeton University and the University of Southern California under the 1997 Research Agreement. Under this 1997 Amended License Agreement, the Company is required to pay Princeton University royalties for licensed products sold by the Company or its sublicensees. For licensed products sold by the Company, the Company is required to pay Princeton University 3% of the net sales price of these products. For licensed products sold by the Company’s sublicensees, the Company is required to pay Princeton 3% of the revenues received by the Company from these sublicensees. These royalty rates are subject to renegotiation for products not reasonably conceivable as arising out of the 1997 Research Agreement if Princeton University reasonably determines that the royalty rates payable with respect to these products are not fair and competitive.

The Company is obligated, under the 1997 Amended License Agreement, to pay to Princeton University minimum annual royalties. The minimum royalty payment is $100,000 per year. The Company recorded royalty expense in connection with this agreement of $3.0 million and $2.0 million for the three months ended June 30, 2017 and 2016, respectively, and $4.6 million and $2.8 million for the six months ended June 30, 2017 and 2016, respectively.

The Company also is required, under the 1997 Amended License Agreement, to use commercially reasonable efforts to bring the licensed OLED technology to market. However, this requirement is deemed satisfied if the Company invests a minimum of $800,000 per year in research, development, commercialization or patenting efforts respecting the patent rights licensed to the Company.

In connection with entering into the 2006 Research Agreement, the Company amended the 1997 Amended License Agreement to include the University of Michigan as a party to that agreement effective as of January 1, 2006. Under this amendment, Princeton University, the University of Southern California and the University of Michigan have granted the Company a worldwide exclusive license, with rights to sublicense, to make, have made, use, lease and/or sell products and to practice processes based on patent applications and issued patents arising out of work performed under the 2006 Research Agreement. The financial terms of the 1997 Amended License Agreement were not impacted by this amendment.

9. EQUITY AND CASH COMPENSATION UNDER THE PPG AGREEMENTS:

On September 22, 2011, the Company entered into an Amended and Restated OLED Materials Supply and Service Agreement with PPG Industries (the New OLED Materials Agreement), which replaced the original OLED Materials Agreement with PPG Industries effective as of October 1, 2011. The term of the New OLED Materials Agreement ran through December 31, 2015 and shall be automatically renewed for additional one year terms, unless terminated by the Company by providing prior notice of one year or terminated by PPG by providing prior notice of two years. The agreement was automatically renewed through December 31, 2017. The New OLED Materials Agreement contains provisions that are substantially similar to those of the original OLED Materials Agreement. Under the New OLED Materials Agreement, PPG Industries continues to assist the Company in developing its proprietary OLED materials and supplying the Company with those materials for evaluation purposes and for resale to its customers.

Under the New OLED Materials Agreement, the Company compensates PPG Industries on a cost-plus basis for the services provided during each calendar quarter. The Company is required to pay for some of these services in all cash. Up to 50% of the remaining services are payable, at the Company’s sole discretion, in cash or shares of the Company’s common stock, with the balance payable in cash. The actual number of shares of common stock issuable to PPG Industries is determined based on the average closing price for the Company’s common stock during a specified number of days prior to the end of each calendar half-year period ending on March 31 and September 30. If, however, this average closing price is less than $20.00, the Company is required to compensate PPG Industries in cash. No shares were issued for services to PPG for the three or six months ended June 30, 2017 or 2016.

The Company is also to reimburse PPG Industries for raw materials used for research and development. The Company records the purchases of these raw materials as a current asset until such materials are used for research and development efforts.

The Company recorded research and development expense of $143,000 and $1.0 million for the three months ended June 30, 2017 and 2016, respectively, and $247,000 and $1.9 million for the six months ended June 30, 2017 and 2016, respectively, in relation to the cash portion of the reimbursement of expenses and work performed by PPG Industries, excluding amounts paid for commercial chemicals.

10. SHAREHOLDERS’ EQUITY:

Common and Preferred Stock

The Company is authorized to issue 100 million shares of $0.01 par value common stock and five million shares of $0.01 par value preferred stock. Each share of the Company’s common stock entitles the holder to one vote on all matters to be voted upon by the shareholders. As of June 30, 2017, the Company had issued 48,444,492 shares of common stock of which 47,086,629 were outstanding and had issued 200,000 shares of preferred stock, all of which were outstanding.

Scientific Advisory Board and Employee Awards

During the first quarters of 2017 and 2016, the Company granted a total of 5,590 and 27,967 shares, respectively, of fully vested common stock to employees and non-employee members of the Scientific Advisory Board for services performed in 2016 and 2015, respectively. The fair value of the shares issued was $165,000 and $1.1 million, respectively, for shares issued to employees and $300,000 for both quarters for shares issued to members of the Scientific Advisory Board, which amounts were accrued at December 31, 2016 and 2015, respectively. In connection with the issuance of these grants, 605 and 8,106 shares, with fair values of $55,000 and $410,000, were withheld in satisfaction of employee tax withholding obligations in 2017 and 2016, respectively.

Excess Tax Benefits from Share-Based Payment Arrangements

On January 1, 2017, the Company adopted ASU No. 2016-09, Improvements to Employee Share-Based Accounting, which includes provisions intended to simplify various aspects related to how share-based payments are accounted for and presented in the financial statements. Under the previous guidance, tax effects of deductions for employee share awards in excess of compensation cost ("windfalls") were recorded in equity in the period in which the deductions actually reduced income taxes payable and any unrecognized tax benefits were tracked separately off the balance sheet. Under the new guidance, excess tax benefits and deficiencies are recorded in the income statement in the period in which stock awards vest or are settled, and any excess tax benefits not previously recognized because the related tax deduction had not reduced current taxes payable, were recorded through a cumulative-effect adjustment to retained earnings at the beginning of the period of adoption.

The cumulative-effect adjustment on retained earnings resulting from the adoption of ASU 2016-09 was a net windfall tax benefit of $26.5 million as of January 1, 2017.

Dividends

During the three months ended June 30, 2017, the Company declared and paid cash dividends of $0.03 per common share, or $1.4 million, and during the six months ended June 30, 2017, the Company declared and paid cash dividends of $0.06 per common share or $2.8 million, on the Company's outstanding common stock.

On August 1, 2017, the Company's Board of Directors declared a third quarter dividend of $0.03 per common share to be paid on September 30, 2017. All future dividends will be subject to the approval of the Company's Board of Directors.

11. ACCUMULATED OTHER COMPREHENSIVE LOSS:

Amounts related to the changes in accumulated other comprehensive loss were as follows (in thousands):

	Unrealized gain (loss) on available-for-sale-securities	Net unrealized gain (loss) on retirement plan [2]	Change in cumulative foreign currency translation adjustment	Total	Affected line items in the consolidated statements of operations
Balance December 31, 2016, net of tax	$ (246)	$ (10,355)	$ (65)	$(10,666)	
Other comprehensive gain (loss) before reclassification	90	—	25	115	
Actuarial gain (loss)	—	(1,662)	—	(1,662)	
Reclassification to net income [1]	—	642	—	642	Selling, general and administrative, research and development, and cost of material sales
Change during period	90	(1,020)	25	(905)	
Balance June 30, 2017, net of tax	$ (156)	$ (11,375)	$ (40)	$(11,571)	

	Unrealized gain (loss) on		Change in cumulative	Total	Affected line items in the

	available-for-sale-securities	Net unrealized gain (loss) on retirement plan (2)	foreign currency translation adjustment		consolidated statements of operations
Balance December 31, 2015, net of tax	$ (111)	$ (9,708)	$ —	$ (9,819)	
Other comprehensive (loss) gain before reclassification	(84)	—	20	(64)	
Actuarial gain (loss)	—	(353)	—	(353)	
Reclassification to net income (1)	—	535	—	535	Selling, general and administrative, research and development, and cost of material sales
Change during period	(84)	182	20	118	
Balance June 30, 2016, net of tax	$ (195)	$ (9,526)	$ 20	$ (9,701)	

(1) The Company reclassified amortization of prior service cost and actuarial loss for its retirement plan from accumulated other comprehensive loss to net income of $642,000 and $535,000 for the six months ended June 30, 2017 and 2016, respectively.
(2) Refer to Note 13: Supplemental Executive Retirement Plan.

12. STOCK-BASED COMPENSATION:

The Company recognizes in the statements of income the grant-date fair value of equity based awards, such as shares issued under employee stock purchase plans, restricted stock awards, restricted stock units and performance unit awards issued to employees and directors.

The grant-date fair value of stock awards is based on the closing price of the stock on the date of grant. The fair value of share-based awards is recognized as compensation expense on a straight-line basis over the requisite service period, net of forfeitures. The Company issues new shares upon the respective grant, exercise or vesting of share-based payment awards, as applicable.

Performance unit awards are subject to either a performance-based or market-based vesting requirement. For performance-based vesting, the grant-date fair value of the award, based on fair value of the Company's common stock, is recognized over the service period based on an assessment of the likelihood that the applicable performance goals will be achieved, and compensation expense is periodically adjusted based on actual and expected performance. Compensation expense for performance unit awards with market-based vesting is calculated based on the estimated fair value as of the grant date utilizing a Monte Carlo simulation model and is recognized over the service period on a straight-line basis.

Equity Compensation Plan

The Equity Compensation Plan provides for the granting of incentive and nonqualified stock options, shares of common stock, stock appreciation rights and performance units to employees, directors and consultants of the Company. Stock options are exercisable over periods determined by the Compensation Committee, but for no longer than 10 years from the grant date. Through June 30, 2017, the Company’s shareholders have approved increases in the number of shares reserved for issuance under the Equity Compensation Plan to 10,500,000, and have extended the term of the plan through 2024. As of June 30, 2017, there were 2,521,173 shares that remained available to be granted under the Equity Compensation Plan.

Stock Awards

Restricted Stock Awards and Units

The Company has issued restricted stock awards and units to employees and non-employees with vesting terms of one to six years. The fair value is equal to the market price of the Company’s common stock on the date of grant for awards granted to employees and equal to the market price at the end of the reporting period for unvested non-employee awards or upon the date of vesting for vested non-employee awards. Expense for restricted stock awards and units is amortized ratably over the vesting period for the awards issued to employees and using a graded vesting method for the awards issued to non-employees.

During the six months ended June 30, 2017, the Company granted 38,725 shares of restricted stock awards and restricted stock units to employees and non-employees, which had a total fair value of $3.6 million on the respective dates of grant, and will vest over three to five years from the date of grant, provided that the grantee is still an employee of the Company or is still providing services to the Company on the applicable vesting date.

For the three months ended June 30, 2017 and 2016, the Company recorded, as compensation charges related to all restricted stock awards and units to employees and non-employees, selling, general and administrative expense of $2.1 million and $1.6 million, respectively, research and development expense of $419,000 and $403,000, respectively, and cost of material sales of $96,000 and $94,000, respectively. For the six months ended June 30, 2017 and 2016, the Company recorded, as compensation charges related to all restricted stock awards and units to employees and non-employees, selling, general and administrative expense of $4.1 million and $3.3 million, respectively, research and development expense of $786,000 and $975,000, respectively, and cost of material sales of $190,000 and $258,000, respectively.

In connection with the vesting of restricted stock awards and units during the three months ended June 30, 2017 and 2016, 50,630 and 82,780 shares, with aggregate fair values of $4.3 million and $4.4 million, respectively, were withheld in satisfaction of tax withholding obligations.

For the three months ended June 30, 2017 and 2016, the Company recorded as compensation charges related to all restricted stock units to non-employee members of the Scientific Advisory Board, research and development expense of $175,000 and $121,000, respectively. For the six months ended June 30, 2017 and 2016, the Company recorded as compensation charges related to all restricted stock units to non-employee members of the Scientific Advisory Board, research and development expense of $445,000 and $164,000, respectively.

Board of Directors Compensation

The Company has granted restricted stock units to non-employee members of the Board of Directors with quarterly vesting over a period of approximately one year. The fair value is equal to the market price of the Company's common stock on the date of grant. The restricted stock units are issued and expense is recognized ratably over the vesting period. For the three months ended June 30, 2017 and 2016, the Company recorded compensation charges for services performed, related to all restricted stock units granted to non-employee members of the Board of Directors, selling, general and administrative expense of $444,000 and $365,000, respectively. For the six months ended June 30, 2017 and 2016, the Company recorded compensation charges for services performed, related to all restricted stock units granted to non-employee members of the Board of Directors, selling, general and administrative expense of $883,000 and $730,000, respectively. In connection with the vesting of the restricted stock, the Company issued 15,000 shares, during both the three months ended June 30, 2017 and 2016, to non-employee members of the Board of Directors.

Performance Unit Awards

During the six months ended June 30, 2017, the Company granted 15,638 performance units, of which 7,817 are subject to a performance-based vesting and 7,821 are subject to a market-based vesting requirement and will vest over the terms described below. Total fair value of the performance unit awards granted was $1.7 million on the date of grant.

Each performance unit award is subject to both a performance-vesting requirement (either performance-based or market-based) and a service-vesting requirement.

The performance-based vesting requirement is tied to the Company's cumulative revenue growth compared to the cumulative revenue growth of companies comprising the Nasdaq Electronics Components Index, as measured over a specific performance period. The market-based vesting requirement is tied to the Company's total shareholder return relative to the total shareholder return of companies comprising the Nasdaq Electronics Components Index, as measured over a specific performance period.

The maximum number of performance units that may vest based on performance is two times the shares granted. Further, if the Company's total shareholder return is negative, the performance units may not vest at all.

For the three months ended June 30, 2017 and 2016, the Company recorded general and administrative credit of $279,000 and expense of $278,000, respectively, research and development credit of $87,000 and expense of $77,000, respectively, and cost of material sales credit of $29,000 and expense of $28,000, respectively, related to performance units. For the six months ended June 30, 2017 and 2016, the Company recorded general and administrative expense of $161,000 and $555,000, respectively, research and development expense of $28,000 and $154,000, respectively, and cost of material sales of $16,000 and $57,000, respectively, related to performance units.

In connection with the vesting of performance units during the six months ended June 30, 2017 and 2016, 19,217 and none shares with an aggregate fair value of $1.6 million and none, respectively, were withheld in satisfaction of tax withholding obligations.

Employee Stock Purchase Plan

On April 7, 2009, the Board of Directors of the Company adopted an Employee Stock Purchase Plan (ESPP). The ESPP was approved by the Company’s shareholders and became effective on June 25, 2009. The Company has reserved 1,000,000 shares of common stock for issuance under the ESPP. Unless terminated by the Board of Directors, the ESPP will expire when all reserved shares have been issued.

Eligible employees may elect to contribute to the ESPP through payroll deductions during consecutive three-month purchase periods. Each employee who elects to participate will be deemed to have been granted an option to purchase shares of the Company’s common stock on the first day of the purchase period. Unless the employee opts out during the purchase period, the option will automatically be exercised on the last day of the period, which is the purchase date, based on the employee’s accumulated contributions to the ESPP. The purchase price will equal 85% of the lesser of the closing price per share of common stock on the first day of the period or the last business day of the period.

Employees may allocate up to 10% of their base compensation to purchase shares of common stock under the ESPP; however, each employee may purchase no more than 12,500 shares on a given purchase date, and no employee may purchase more than $25,000 of common stock under the ESPP during a given calendar year.

During the six months ended June 30, 2017 and 2016, the Company issued 5,928 and 4,331 shares, respectively, of its common stock under the ESPP, resulting in proceeds of $349,000 and $201,000, respectively.

For the three months ended June 30, 2017 and 2016, the Company recorded charges of $21,000 and $10,000, respectively, to selling, general and administrative expense, $23,000 and $18,000, respectively, to research and development expense, and $13,000 and $4,000, respectively, to cost of material sales related to the ESPP equal to the amount of the discount and the value of the look-back feature.

For the six months ended June 30, 2017 and 2016, the Company recorded charges of $36,000 and $20,000, respectively, to selling, general and administrative expense, $47,000 and $35,000, respectively, to research and development expense, and $18,000 and $8,000, respectively, to cost of material sales related to the ESPP equal to the amount of the discount and the value of the look-back feature.

13. SUPPLEMENTAL EXECUTIVE RETIREMENT PLAN:

On March 18, 2010, the Compensation Committee and the Board of Directors of the Company approved and adopted the Universal Display Corporation Supplemental Executive Retirement Plan (SERP), effective as of April 1, 2010. On March 3, 2015, the Compensation Committee and the Board of Directors amended the SERP to include salary and bonus as part of the plan. Prior to this amendment, the SERP benefit did not take into account any bonuses. This change increased the liability related to the SERP. The purpose of the SERP, which is unfunded, is to provide certain of the Company’s key employees with supplemental retirement benefits following a cessation of their employment and to encourage their continued employment with the Company. As of June 30, 2017, there were six participants in the SERP.

The Company records amounts relating to the SERP based on calculations that incorporate various actuarial and other assumptions, including discount rates, rate of compensation increases, retirement dates and life expectancies. The net periodic costs are recognized as employees render the services necessary to earn the SERP benefits.

The components of net periodic pension cost were as follows (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2017	2016	2017	2016
Service cost	$302	$350	$603	$708
Interest cost	252	207	494	437
Amortization of prior service cost	415	393	830	830
Amortization of loss	114	4	161	7
Total net periodic benefit cost	$1,083	$954	$2,088	$1,982

14. COMMITMENTS AND CONTINGENCIES:

Commitments

Under the 2006 Research Agreement with USC, the Company is obligated to make certain payments to USC based on work performed by USC under that agreement, and by Michigan under its subcontractor agreement with USC. See Note 8 for further explanation.

Under the terms of the 1997 Amended License Agreement, the Company is required to make minimum royalty payments to Princeton. See Note 8 for further explanation.

The Company has agreements with six executive officers and one employee which provide for certain cash and other benefits upon termination of employment of the officer in connection with a change in control of the Company. If the executive's employment is terminated in connection with the change in control, the executive is entitled to a lump-sum cash payment equal to two times the sum of the average annual base salary and bonus of the officer and immediate vesting of all stock options and other equity awards that may be outstanding at the date of the change in control, among other items.

In order to manage manufacturing lead times and help ensure adequate material supply, the Company entered into an OLED Materials Agreement (see Note 9) that allows PPG Industries to procure and produce inventory based upon criteria as defined by the Company. These purchase commitments consist of firm, noncancelable and unconditional commitments. In certain instances, this agreement allows the Company the option to reschedule and adjust the Company's requirements based on its business needs prior to firm orders being placed. As of June 30, 2017 and December 31, 2016, the Company had purchase commitments for inventory of $8.6 million and $5.0 million, respectively.

Patent Related Challenges and Oppositions

Each major jurisdiction in the world that issues patents provides both third parties and applicants an opportunity to seek a further review of an issued patent. The process for requesting and considering such reviews is specific to the jurisdiction that issued the patent in question, and generally does not provide for claims of monetary damages or a review of specific claims of infringement. The conclusions made by the reviewing administrative bodies tend to be appealable and generally are limited in scope and applicability to the specific claims and jurisdiction in question.

The Company believes that opposition proceedings are frequently commenced in the ordinary course of business by third parties who may believe that one or more claims in a patent do not comply with the technical or legal requirements of the specific jurisdiction in which the patent was issued. The Company views these proceedings as reflective of its goal of obtaining the broadest legally permissible patent coverage permitted in each jurisdiction. Once a proceeding is initiated, as a general matter, the issued patent continues to be presumed valid until the jurisdiction's applicable administrative body issues a final non-appealable decision. Depending on the jurisdiction, the outcome of these proceedings could include affirmation, denial or modification of some or all of the originally issued claims. The Company believes that as OLED technology becomes more established and its patent portfolio increases in size, so will the number of these proceedings.

Below are summaries of certain active proceedings that have been commenced against issued patents that are either exclusively licensed to the Company or which are now assigned to the Company. The Company does not believe that the confirmation, loss or modification of the Company's rights in any individual claim or set of claims that are the subject of the following legal proceedings would have a material impact on the Company's materials sales or licensing business or on the Company's consolidated financial statements, including its consolidated statements of income, as a whole. However, as noted within the descriptions, some of the following proceedings involve issued patents that relate to the Company's fundamental phosphorescent OLED technologies and the Company intends to vigorously defend against claims that, in the Company's opinion, seek to restrict or reduce the scope of the originally issued claim, which may require the expenditure of significant amounts of the Company's resources. In certain circumstances, when permitted, the Company may also utilize the proceedings to request modification of the claims to better distinguish the patented invention from any newly identified prior art and/or improve the claim scope of the patent relative to commercially important categories of the invention. The entries marked with an "*" relate to the Company's UniversalPHOLED® phosphorescent OLED technology, some of which may be commercialized by the Company.

Opposition to European Patent No. 1394870*

On April 20, 2010, Merck Patent GmbH; BASF Schweitz AG of Basel, Switzerland; Osram GmbH of Munich, Germany; Siemens Aktiengesellschaft of Munich, Germany; and Koninklijke Philips Electronics N.V., of Eindhoven, The Netherlands filed Notices of Opposition to European Patent No.1394870 (the EP '870 patent). The EP '870 patent, which was issued on July 22, 2009, is a European counterpart patent, in part, to U.S. patents 6,303,238; 6,579,632; 6,872,477; 7,279,235; 7,279,237; 7,488,542; 7,563,519; and 7,901,795; and to pending U.S. patent application 13/035,051, filed on February 25, 2011 (hereinafter the "U.S. '238 Patent Family"). They are exclusively licensed to the Company by Princeton, and the Company is required to pay all legal costs and fees associated with this proceeding.

An Oral Hearing was held before a European Patent Office (EPO) panel of first instance in Munich, Germany, on April 8-9, 2014. The panel rejected the original claims and amended the claims to comply with EPO requirements by more narrowly defining the scope of the claims. The '870 patent, in its amended form, was held by the panel to comply with the EPO requirements.

The Company believes the EPO's decision relating to the broad original claims is erroneous and has appealed the ruling to reinstate a broader set of claims. This patent, as originally granted by the EPO, is deemed valid during the pendency of the appeals process.

At this time, based on the Company's current knowledge, the Company believes that the patent being challenged should be declared valid and that all or a significant portion of the Company's claims should be upheld. However, the Company cannot make any assurances of this result.

Opposition to European Patent No. 1390962

On November 16, 2011, Osram AG and BASF SE each filed a Notice of Opposition to European Patent No. 1390962 (EP '962 patent), which relates to the Company’s white phosphorescent OLED technology. The EP '962 patent, which was issued on February 16, 2011, is a European counterpart patent to U.S. patents 7,009,338 and 7,285,907. They are exclusively licensed to the Company by Princeton, and the Company is required to pay all legal costs and fees associated with this proceeding.

The EPO combined the oppositions into a single opposition proceeding, and a hearing on this matter was held in December 2015, wherein the EPO Opposition Division revoked the patent claims for alleged insufficiencies under EPC Article 83. The Company believes the EPO's decision relating to the original claims is erroneous, and has appealed the decision. The patent, as originally granted, is deemed valid during the pendency of the appeals process.

At this time, based on its current knowledge, the Company believes that the patent being challenged should be declared valid, and that all or a significant portion of the Company's claims should be upheld. However, the Company cannot make any assurances of this result.

Opposition to European Patent No. 1933395*

On February 24 and 27, 2012, Sumitomo, Merck Patent GmbH and BASF SE filed oppositions to the Company's European Patent No. 1933395 (the EP '395 patent). The EP ‘395 patent is a counterpart to the EP ‘637 patent, and, in part, to U.S. Patents 7,001,536, 6,902,830, and 6,830,828, and to JP patents 4358168 and 4357781. This patent is exclusively licensed to the Company by Princeton, and the Company is required to pay all legal costs and fees associated with this proceeding.

At an Oral Hearing on October 14, 2013, the EPO panel issued a decision that affirmed the basic invention and broad patent coverage in the EP '395 patent, but narrowed the scope of the original claims.

On February 26, 2014, the Company appealed the ruling to reinstate a broader set of claims. The patent, as originally granted by the EPO, is deemed to be valid during the pendency of an appeals process. Two of the three opponents also filed their own appeals of the ruling. In January 2015, Sumitomo withdrew its opposition of the '395 patent, and the EPO accepted the withdrawal notice. The appeal proceedings were held in the second quarter of 2016. As a result of the proceedings, the board concluded the oral proceedings and proposed to reinstate a broader set of claims pending the resolution of a remaining question of the applicable law, a question that the board has deferred to the Enlarged Board of Appeals for review. The originally-granted claims remain in force during the pendency of this process.

In addition to the above proceedings and now concluded proceedings which have been referenced in prior filings, from time to time, the Company may have other proceedings that are pending which relate to patents the Company acquired as part of the Fujifilm patent or BASF OLED patent acquisitions or which relate to technologies that are not currently widely utilized in the marketplace.

15. CONCENTRATION OF RISK:

Included in contract services revenue in the accompanying statement of operations is none and $59,000 for the three months ended June 30, 2017 and 2016, respectively, and $10,000 and $116,000 for the six months ended June 30, 2017 and 2016, respectively, which was derived from contracts with United States government agencies. Revenues derived from contracts with United States government agencies represented less than 1% of the consolidated revenue for all periods presented.

Revenues and accounts receivable from the Company's largest customers were as follows (in thousands):

	% of Revenues for the three months ended		% of Revenues for the six months ended		
Customer	June 30, 2017	2016	June 30, 2017	2016	Accounts Receivable as of June 30, 2017
A	73%	76%	66%	64%	$ 20,210
B	17%	18%	23%	29%	$ 10,587

C	5%	3%	4%	4%	$ 3,561

Revenues from outside of North America represented approximately 98% and 99% of consolidated revenue for the three months ended June 30, 2017 and 2016, respectively, and 97% and 99% of consolidated revenue for the six months ended June 30, 2017 and 2016, respectively. Revenues by geographic area are as follows (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
Country	2017	2016	2017	2016
South Korea	$92,206	$61,196	$140,134	$87,142
China	5,414	1,812	7,896	3,569
Japan	2,044	800	3,128	2,104
Other non-U.S. locations	822	405	1,534	1,018
Total non-U.S. locations	$100,486	$64,213	$152,692	$93,833
United States	2,027	179	5,387	262
Total revenue	$102,513	$64,392	$158,079	$94,095

The Company attributes revenue to different geographic areas on the basis of the location of the customer.

Long-lived assets (net), by geographic area are as follows (in thousands):

	June 30, 2017	December 31, 2016
United States	$38,587	$ 26,917
Other	104	286
Total long-lived assets	$38,691	$ 27,203

Substantially all chemical materials were purchased from one supplier. See Note 9.

16. INCOME TAXES:

On January 1, 2017, the Company adopted ASU No. 2016-09, Improvements to Employee Share-Based Accounting, which includes provisions intended to simplify various aspects related to how share-based payments are accounted for and presented in the financial statements. Under the previous guidance, tax effects of deductions for employee share awards in excess of compensation cost ("windfalls") were recorded in equity in the period in which the deductions actually reduced income taxes payable and any unrecognized tax benefits were tracked separately off the balance sheet. Under the new guidance, excess tax benefits and deficiencies are recorded in the income statement in the period in which stock awards vest or are settled, and any excess tax benefits not previously recognized because the related tax deduction had not reduced current taxes payable, are recorded through a cumulative-effect adjustment to retained earnings at the beginning of the period of adoption.

The Company is subject to income taxes in both the United States and foreign jurisdictions. The effective income tax rate was 23.0% and 22.3%, respectively, for the three and six months ended June 30, 2017. The tax rate reflected a benefit from the utilization of a valuation allowance at UDC Ireland. For the three and six months ended June 30, 2017 the Company recorded income tax expense of $14.1 million and $16.5 million, respectively.

Without the adoption of ASU No. 2016-09 for the three and six months ended June 30, 2017 the effective income tax rate would have been 24.2% and 24.8%, respectively, and income tax expense would have been $14.8 million and $18.4 million, respectively.

The effective income tax rate was 33.6% and 33.5%, respectively, for the three and six months ended June 30, 2016. For the three and six months ended June 30, 2016, income tax expense of $11.0 million and $12.0 million, respectively.

In assessing the realizability of deferred tax assets, management considers whether it is more likely than not that some portion or all of the deferred tax assets will not be realized. The ultimate realization of deferred tax assets is dependent on the Company's ability to generate future taxable income to obtain benefit from the reversal of temporary differences, net operating loss carryforwards and tax credits. As part of its assessment management considers the scheduled reversal of deferred tax liabilities, projected future taxable income, and tax planning strategies. At this time there is no evidence to release the valuation allowances that relate to UDC Ireland and New Jersey research and development credits.

17. NET INCOME PER COMMON SHARE:

The Company computes earnings per share in accordance with ASC Topic 260, Earnings per Share ("ASC 260"), which requires earnings per share for each class of stock to be calculated using the two-class method. The two-class method is an allocation of income between the holders of common stock and the Company's participating security holders. Under the two-class method, income for the reporting period is allocated between common shareholders and other security holders based on their respective participation rights in undistributed income. Unvested share-based payment awards that contain non-forfeitable rights to dividends or dividend equivalents are participating securities and, therefore, are included in computing earnings per share pursuant to the two-class method.

Basic net income per common share is computed by dividing net income allocated to common shareholders by the weighted-average number of shares of common stock outstanding for the period excluding unvested restricted stock units and performance units. Net income allocated to the holders of the Company's unvested restricted stock awards is calculated based on the shareholder’s proportionate share of weighted average shares of common stock outstanding on an if-converted basis.

For purposes of determining diluted net income per common share, basic net income per share is further adjusted to include the effect of potential dilutive common shares outstanding, including stock options, restricted stock units and performance units, and the impact of shares to be issued under the ESPP.

The following table is a reconciliation of net income and the shares used in calculating basic and diluted net income per common share for the three and six months ended June 30, 2017 and 2016 (in thousands, except share and per share data):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2017	2016	2017	2016
Numerator:				
Net income	$47,187	$21,802	$57,552	$23,751
Adjustment for Basic EPS:				
Earning allocated to unvested shareholders	(727)	—	(972)	(32)
Adjusted net income	$46,460	$21,802	$56,580	$23,719
Denominator:				
Weighted average common shares outstanding – Basic	46,742,746	46,927,543	46,702,376	46,862,199
Effect of dilutive shares:				
Common stock equivalents arising from stock options and ESPP	1,450	4,051	2,324	6,914
Restricted stock awards and units and performance units	66,042	110,260	76,420	116,261
Weighted average common shares outstanding – Diluted	46,810,238	47,041,854	46,781,120	46,985,374
Net income per common share:				
Basic	$0.99	$0.46	$1.21	$0.51
Diluted	$0.99	$0.46	$1.21	$0.51

For the three months ended June 30, 2017 and 2016, there were no unvested restricted stock awards, restricted stock units, performance unit awards and stock options excluded from the calculation of diluted EPS as their impact would have been antidilutive. For the six months ended June 30, 2017 and 2016, the combined effects of unvested restricted stock awards, restricted stock units, performance unit awards and stock options of none and 99, respectively, were excluded from the calculation of diluted EPS as their impact would have been antidilutive. The impact of shares to be issued under the ESPP, which was not significant, was excluded from the calculation of diluted EPS as their impact would have been antidilutive.

ITEM 2.MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

The following discussion and analysis of our financial condition and results of operations should be read in conjunction with the consolidated financial statements and related notes above.

CAUTIONARY STATEMENT

CONCERNING FORWARD-LOOKING STATEMENTS

This discussion and analysis contains some "forward-looking statements." Forward-looking statements concern possible or assumed future results of operations, including descriptions of our business strategies and customer relationships. These statements often include words such as "believe," "expect," "anticipate," "intend," "plan," "estimate," "seek," "will," "n similar expressions. These statements are based on assumptions that we have made in light of our experience in the industry, as well as our perceptions of historical trends, current conditions, expected future developments and other factors that we believe are appropriate in these circumstances.

As you read and consider this discussion and analysis, you should not place undue reliance on any forward-looking statements. You should understand that these statements involve substantial risk and uncertainty and are not guarantees of future performance or results. They depend on many factors that are discussed further in the section entitled (Risk Factors) in our Annual Report on Form 10-K for the year ended December 31, 2016, as supplemented by disclosures, if any, in Item 1A of Part II below. Changes or developments in any of these areas could affect our financial results or results of operations and could cause actual results to differ materially from those contemplated in the forward-looking statements.

All forward-looking statements speak only as of the date of this report or the documents incorporated by reference, as the case may be. We do not undertake any duty to update any of these forward-looking statements to reflect events or circumstances after the date of this report or to reflect the occurrence of unanticipated events.

OVERVIEW

We are a leader in the research, development and commercialization of organic light emitting diode, or OLED, technologies and materials for use in displays for mobile phones, televisions, tablets, wearables, portable media devices, notebook computers, personal computers and automotive interiors, as well as specialty and general lighting products. Since 1994, we have been exclusively engaged, and expect to continue to be primarily engaged, in funding and performing research and development activities relating to OLED technologies and materials, and commercializing these technologies and materials. We derive our revenue from the following:

- sales of OLED materials for evaluation, development and commercial manufacturing;
- intellectual property and technology licensing;
- contract research services, and
- technology development and support, including government contract work and support provided to third parties for commercialization of their OLED products.

Material sales relate to our sale of OLED materials for incorporation into our customers' commercial OLED products or for their OLED development and evaluation activities. Material sales are recognized at the time title passes, which is typically at the time of shipment or at the time of delivery, depending upon the contractual agreement between the parties.

We receive license and royalty payments under certain commercial, development and technology evaluation agreements, some of which are non-refundable advances. These payments may include royalty and license fees made pursuant to license agreements and also license fees included as part of certain commercial supply agreements. For arrangements with extended payment terms where the fee is not fixed or determinable, we recognize revenue when the payment is due and payable. Royalty revenue and license fees included as part of commercial supply agreements are recognized when earned and the amount is fixed and determinable.

Our commercial license agreement with Samsung Display Co., Ltd. (SDC) currently runs through the end of 2017 and covers the manufacture and sale of specified OLED display products. Under this agreement, we are being paid a license fee, payable in semi-annual installments over the agreement term of 6.4 years. The installments, which are due in the second and fourth quarter of each year, increase on an annual basis over the term of the agreement. The agreement conveys to SDC the non-exclusive right to use certain of our intellectual property assets for a limited period of time that is less than the estimated life of the assets. Ratable recognition of revenue is impacted by the agreement's extended increasing payment terms in light of our limited history with similar agreements. As a result, revenue is recognized at the lesser of the proportional performance approach (ratable) and the amount of due and payable fees from SDC. Given the increasing contractual payment schedule, license fees under the agreement are recognized as revenue when they become due and payable, which is currently scheduled to be in the second and fourth quarter of each year.

At the same time we entered into the current patent license agreement with SDC, we also entered into a new supplemental material purchase agreement with SDC. Under the current supplemental material purchase agreement, SDC agrees to purchase from us a minimum dollar amount of phosphorescent emitter materials for use in the manufacture of licensed products. This minimum purchase commitment is subject to SDC’s requirements for phosphorescent emitter materials and our ability to meet these requirements over the term of the supplemental agreement. The minimum purchase amounts increase on an annual basis over the term of the supplemental agreement. These amounts were determined through negotiation based on a number of factors, including, without limitation, estimates of SDC’s OLED business growth as a percentage of published OLED market forecasts and SDC’s projected minimum usage of red and green phosphorescent emitter materials over the term of the agreement.

In 2015, we entered into an OLED patent license agreement and an OLED commercial supply agreement with LG Display Co., Ltd. (LG Display), which were effective as of January 1, 2015 and superseded the existing 2007 commercial supply agreement between the parties. The new agreements have a term that is set to expire by the end of 2022. The patent license agreement provides LG Display a non-exclusive, royalty bearing portfolio license to make and sell OLED displays under the Company's patent portfolio. The patent license calls for license fees, prepaid royalties and running royalties on licensed products. The prepaid royalty amount is included in deferred revenue and a portion of this amount can be credited against total royalties due over the life of the contract. The agreements include customary provisions relating to warranties, indemnities, confidentiality, assignability and business terms. The agreements provide for certain other minimum obligations relating to the volume of material sales anticipated over the term of the agreements as well as minimum royalty revenue to be generated under the patent license agreement. We expect to generate revenue under these agreements that are predominantly tied to LG Display's sales of OLED licensed products. The OLED commercial supply agreement provides for the sales of materials for use by LG Display, which may include phosphorescent dopants and host materials.

In 2016, we entered into an OLED Technology License Agreement and Commercial Material Supply Agreement with Tianma Micro-electronics Co., Ltd. (Tianma) which were both effective July 21, 2016 and run for five years. Under the license agreement, we have granted Tianma non-exclusive license rights under various patents owned or controlled by us to manufacture and sell OLED display products. The license agreement calls for license fees and running royalties on licensed products. Additionally, we expect to supply phosphorescent OLED materials to Tianma for use in its licensed products.

In 2016, we entered into and consummated the transactions contemplated by an IP Transfer Agreement with BASF SE (BASF). Under the IP Transfer Agreement, BASF sold to us certain of its rights, title and interest to its owned and co-owned intellectual property rights relating to the composition, development, manufacture and use of OLED materials, including OLED lighting and display stack technology, as well as certain tangible assets. The intellectual property includes knowhow and more than 500 issued and pending patents in the area of phosphorescent materials and technologies.

In 2016, we entered into an agreement to acquire Adesis, Inc. (Adesis), a privately held contract research organization with 43 employees specializing in organic and organometallic synthetic research, development, and commercialization. Adesis is a technology vendor to companies in the pharmaceutical, fine chemical, biomaterials, and catalyst industries, and has worked with us over the last few years to help advance and accelerate a number of our product offerings. The transaction closed on July 11, 2016. Under the terms of the agreement, our subsidiary, UDC, Inc., acquired all outstanding shares of Adesis in a merger for $33.7 million in cash, and up to an additional $2.4

million in cash contingent upon Adesis' achievement of certain milestones within two years of acquisition. The acquisition was funded through use of existing cash and investments.

Contract research services revenue is revenue earned by performing organic and organometallic synthetics research, development and commercialization on a contractual basis for our customers. We also generate technology development and support revenue earned from government contracts, development and technology evaluation agreements and commercialization assistance fees, which include reimbursements by government entities for all or a portion of the research and development costs we incur in relation to our government contracts. Revenues are recognized as services are performed, proportionally as research and development costs are incurred, or as defined milestones are achieved.

We anticipate fluctuations in our annual and quarterly results of operations due to uncertainty regarding, among other factors:

- the timing, cost and volume of sales of our OLED materials;
- the timing of our receipt of license fees and royalties, as well as fees for future technology development and evaluation;

- the timing and magnitude of expenditures we may incur in connection with our ongoing research and development and patent-related activities; and
- the timing and financial consequences of our formation of new business relationships and alliances.

RESULTS OF OPERATIONS

Comparison of the Three Months Ended June 30, 2017 and 2016

We had operating income of $60.5 million for the three months ended June 30, 2017, compared to operating income of $34.0 million for the three months ended June 30, 2016. The increase in operating income was primarily due to the following:

- an increase in material sales of $24.5 million partially offset by an increase in the cost of material sales of $4.5 million;
- an increase in royalties and license fees of $11.6 million; partially offset by
- an increase in operating expenses of $6.0 million.

We had net income of $47.2 million or $0.99 per basic and diluted share for the three months ended June 30, 2017 as compared to net income of $21.8 million or $0.46 per basic and diluted share for the three months ended June 30, 2016. The increase in net income was due to an increase in operating income of $26.5 million and interest income, net, of $143,000, partially offset by an increase in income tax expense of $3.1 million.

Revenue

The following table details our revenues for the three months ended June 30, 2017 and 2016 (in thousands):

	Three Months Ended June 30,		Increase	
	2017	2016	$	%
REVENUE:				
Material sales	$46,828	$22,315	$24,513	110 %
Royalty and license fees	53,667	42,018	11,649	28 %
Contract research services	2,018	59	1,959	3320 %
Total revenue	$102,513	$64,392	$38,121	59 %

Total revenue for the three months ended June 30, 2017 increased by $38.1 million as compared to the three months ended June 30, 2016. The increase in revenue was the result of an increase in material sales, royalty and license fees, and contract research services.

Material sales

The following table details our revenues derived from material sales for the three months ended June 30, 2017 and 2016 (in thousands):

	Three Months Ended June 30,	Increase

	2017	2016	$	%
Material Sales:				
Commercial material sales	$ 30,874	$ 20,726	$ 10,148	49 %
Developmental material sales	15,954	1,589	14,365	904 %
Total material sales	$ 46,828	$ 22,315	$ 24,513	110 %

Commercial material sales include sales of phosphorescent emitter material that we have validated for high-volume commercial production. Commercial material sales for the three months ended June 30, 2017 increased by $10.1 million as compared to the three months ended June 30, 2016 due to an increase in sales volume resulting from higher phosphorescent emitter demand.

Development material sales include sales of new materials for customer evaluation, and sales of materials that are being scaled up for high volume commercial production. Developmental material sales for the three months ended June 30, 2017 increased by $14.4 million as compared to the three months ended June 30, 2016 due to the timing of materials in the development cycle. In the three months ended June 30, 2017, we had several emitters that were being scaled up, compared to minimal such activity in the three months ended June 30, 2016.

Material sales included sales of both phosphorescent emitter and host materials comprised of the following for the three months ended June 30, 2017 and 2016 (in thousands):

	Three Months Ended June 30,		Increase	
	2017	2016	$	%
Material Sales:				
Phosphorescent emitter sales	$46,039	$22,158	$23,881	108%
Host material sales	789	157	632	403%
Total material sales	$46,828	$22,315	$24,513	110%

Phosphorescent emitter sales for the three months ended June 30, 2017 increased $23.9 million as compared to the three months ended June 30, 2016 due to an increase in sales volume resulting from higher demand for both red and green phosphorescent emitters.

Host material sales for the three months ended June 30, 2017 increased by $632,000 as compared to the three months ended June 30, 2016. Based on our current sales forecast, we anticipate that sales of existing host material will continue to be minimal. Our customers are not required to purchase our host materials in order to utilize our phosphorescent emitter materials and the host material sales business continues to be more competitive than the phosphorescent emitter material sales business.

Royalty and license fees

Royalty and license fees were as follows for the three months ended June 30, 2017 and 2016 (in thousands):

	Three Months Ended June 30,		Increase	
	2017	2016	$	%
Royalty and license fees	$53,667	$42,018	$11,649	28%

Royalty and license fees for the three months ended June 30, 2017 increased by $11.6 million as compared to the three months ended June 30, 2016. The increase was primarily related to the receipt and recognition of $45.0 million of royalty and license fee payments under our patent license agreement with SDC compared to $37.5 million in the prior period, as well as by higher licensed sales from our customers.

Contract research services

Contract research services were as follows for the three months ended June 30, 2017 and 2016 (in thousands):

	Three Months Ended June 30,		Increase	

	2017	2016	$	%
Contract research services	$ 2,018	$ 59	$1,959	3320%

Contract research services include revenue earned by our subsidiary, Adesis, which performs organic and organometallic synthetics research, development and commercialization on a contractual basis for our customer. Contract research services also include technology development and support revenue earned on government contracts, development and technology evaluation agreements and commercialization assistance fees, which includes reimbursement by the U.S. government for all or a portion of the research development expenses we incur related to our government contracts.

Contract research services revenue for the three months ended June 30, 2017 increased by $2.0 million as compared to the three months ended June 30, 2016. The increase in contract research services revenue was related to contract research sales activities associated with Adesis, which was acquired on July 11, 2016.

Cost of material sales

Cost of material sales for the three months ended June 30, 2017 and 2016 were as follows (in thousands):

	Three Months Ended June 30, 2017	2016	Increase $	%
Material Sales	$46,828	$22,315	$24,513	110%
Cost of material sold	9,894	5,684	4,210	74 %
Gross margin on material sales	36,934	16,631	20,303	122%
Gross margin as a % of material sales	79 %	75 %		

Cost of material sales for the three months ended June 30, 2017 increased by $4.2 million as compared to the three months ended June 30, 2016 and was primarily due to an increase in the level of material sales.

Cost of commercial material sold for the three months ended June 30, 2017 and 2016 were as follows (in thousands):

	Three Months Ended June 30, 2017	2016	Increase $	%
Commercial material sales	$30,874	$20,726	$10,148	49%
Cost of commercial material sold	6,370	4,624	1,746	38%
Gross margin on commercial material sales	24,504	16,102	8,402	52%
Gross margin as a % of commercial material sales	79 %	78 %		

Cost of commercial material sold for the three months ended June 30, 2017 increased by $1.7 million as compared to the three months ended June 30, 2016 and was due to an increase in the level of commercial material sales. Gross margin on commercial material sales for the three months ended June 30, 2017 increased by $8.4 million as compared to the three months ended June 30, 2016.

Cost of commercial material sold includes the cost of producing materials, shipping costs for such materials and inventory write-downs, but excludes the cost of producing certain early development material. Depending on the amount, timing and stage of production of such materials, we expect the cost of commercial materials sold to fluctuate from quarter to quarter.

Cost of development material sold for the three months ended June 30, 2017 and 2016 were as follows (in thousands):

	Three Months Ended June 30, 2017	2016	Increase $	%
Development material sales	$15,954	$1,589	$14,365	904 %
Cost of development material sold	3,524	1,060	2,464	232 %
Gross margin on development material sales	12,430	529	11,901	2250%
Gross margin as a % of development material sales	78 %	33 %		

Cost of development material sold for the three months ended June 30, 2017 increased by $2.5 million as compared to the three months ended June 30, 2016 and was due to the timing of emitters in the development cycle. In the three months ended June 30, 2017, we had several emitters that were in the latter stages of the development cycle prior to transitioning through commercial validation, compared to minimal such activity in the three months ended June 30, 2016. This resulted in higher material costs and improved gross margin as a percentage of development material sales in the three months ended June 30, 2017 as compared to the same three-month period in the prior year.

Research and development

Research and development expenses decreased to $10.7 million for the three months ended June 30, 2017, as compared to $11.0 million for the three months ended June 30, 2016.

Selling, general and administrative

Selling, general and administrative expenses increased to $9.8 million for the three months ended June 30, 2017, as compared to $7.7 million for the three months ended June 30, 2016. The increase in selling, general and administrative expenses was primarily due to incremental costs associated with the addition of Adesis activity, as well as higher employee-related and other operating costs.

Amortization of acquired technology and other intangible assets

Amortization of acquired technology and other intangible assets increased to $5.5 million for the three months ended June 30, 2017, as compared to $2.8 million for the three months ended June 30, 2016. The increase was due to higher amortization expense of $2.7 million associated with the acquisitions of the BASF patent portfolio and intangible assets associated with the Adesis acquisition.

Patent costs

Patent costs increased to $1.7 million for the three months ended June 30, 2017, as compared to $1.2 million for the three months ended June 30, 2016.

Royalty and license expense

Royalty and license expense increased to $3.0 million for the three months ended June 30, 2017, as compared to $2.0 million for the three months ended June 30, 2016. The increase was due to increased royalties incurred under our amended license agreement with Princeton, USC, and Michigan, resulting from an increase in qualifying material sales. See Note 8 in Notes to Consolidated Financial Statements for further discussion.

Interest income, net and other income (expense), net

Interest income, net was $796,000 for the three months ended June 30, 2017, as compared to $653,000 for the three months ended June 30, 2016. Other income (expense), net primarily consisted of net exchange gains and losses on foreign currency transactions. We recorded other income of $6,000 for the three months ended June 30, 2017, as compared to other expense of $1.8 million for the three months ended June 30, 2016. Other expense for the 2016 period primarily consisted of exchange losses on foreign currency associated with the BASF OLED patent acquisition.

Income tax expense

On January 1, 2017, we adopted ASU No. 2016-09, Improvements to Employee Share-Based Accounting, which includes provisions intended to simplify various aspects related to how share-based payments are accounted for and presented in the financial statements. Under the previous guidance, tax effects of deductions for employee share awards in excess of compensation cost ("windfalls") were recorded in equity in the period in which the deductions actually reduced income taxes payable and any unrecognized tax benefits were tracked separately off the balance sheet. Under the new guidance, excess tax benefits and deficiencies are recorded in the income statement in the period in which stock awards vest or are settled, and any excess tax benefits not previously recognized because the related tax deduction had not reduced current taxes payable, are recorded through a cumulative-effect adjustment to retained earnings at the beginning of the period of adoption

We are subject to income taxes in both the United States and foreign jurisdictions. The effective income tax rate was 23.0% and 33.6%, for the three months ended June 30, 2017 and 2016, respectively, and we recorded income tax expense of $14.1 million and $11.0 million, respectively. The effective income tax rate for the three months ended June 30, 2017 reflected a benefit from the utilization of a valuation allowance at UDC Ireland.

Without the adoption of ASU No. 2016-09, for the three months ended June 30, 2017, the effective income tax rate and income tax expense would have been 24.2% and $14.8 million.

Comparison of the Six Months Ended June 30, 2017 and 2016

We had operating income of $72.6 million for the six months ended June 30, 2017, as compared to operating income of $36.7 million for the six months ended June 30, 2016. The increase in operating income was primarily due to the following:

- an increase in material sales of $46.8 million partially offset by an increase in the cost of material sales of $11.3 million;
- an increase in royalties and license fees of $13.3 million; partially offset by
- an increase in operating expenses of $14.5 million.

We had net income of $57.6 million or $1.21 per basic and diluted share for the six months ended June 30, 2017, compared to net income of $23.8 million or $0.51 per basic and diluted share for the six months ended June 30, 2016. The increase in net income was due to an increase in operating income of $35.9 million and interest income, net, of $489,000, partially offset by an increase in income tax expense of $4.5 million.

Revenue

The following table details our revenues for the six months ended June 31, 2017 and 2016 (in thousands):

	Six Months Ended June 30,		Increase	
	2017	2016	$	%
REVENUE:				
Material sales	$93,465	$46,619	$46,846	100 %
Royalty and license fees	60,692	47,360	13,332	28 %
Contract Research Services	3,922	116	3,806	3281 %
Total revenue	$158,079	$94,095	$63,984	68 %

Total revenue for the six months ended June 30, 2017 increased by $64.0 million compared to the six months ended June 30, 2016. The increase in revenue was the result of an increase in material sales, royalty and license fees, and contract research services.

Material sales

The following table details our revenues derived from material sales for the six months ended June 30, 2017 and 2016 (in thousands):

	Six Months Ended June 30,		Increase	
	2017	2016	$	%
Material Sales:				
Commercial material sales	$66,677	$42,840	$23,837	56 %
Developmental material sales	26,788	3,779	23,009	609 %
Total material sales	$93,465	$46,619	$46,846	100 %

Commercial material sales for the six months ended June 30, 2017 increased by $23.8 million as compared to the six months ended June 30, 2016 due to an increase in sales volume resulting from higher phosphorescent emitter demand.

Developmental material sales for the six months ended June 30, 2017 increased by $23.0 million compared to the six months ended June 30, 2016 due the timing of materials in the development cycle. In the six months ended June 30, 2017, we had several emitters that were being scaled up, compared to minimal such activity in the six months ended June 30, 2016.

Material sales included sales of both phosphorescent emitter and host materials comprised of the following for the six months ended June 30, 2017 and 2016 (in thousands):

	Six Months Ended June 30,		Increase	
	2017	2016	$	%
Material Sales:				
Phosphorescent emitter sales	$92,221	$46,021	$46,200	100%
Host material sales	1,244	598	646	108%
Total material sales	$93,465	$46,619	$46,846	100%

Phosphorescent emitter sales for the six months ended June 30, 2017 increased $46.2 million compared to the six months ended June 30, 2016 due to an increase in sales volume resulting from higher demand for both red and green phosphorescent emitters.

Host material sales for the six months ended June 30, 2017 increased by $646,000 compared to the six months ended June 30, 2016. Based on our current sales forecast, we anticipate that sales of existing host material will continue to be minimal. Our customers are not required to purchase our host materials in order to utilize our phosphorescent emitter materials and the host material sales business continues to be more competitive than the phosphorescent emitter material sales business.

Royalty and license fees

Royalty and license fees were as follows for the six months ended June 30, 2017 and 2016 (in thousands):

	Six Months Ended June 30, 2017	2016	Increase $	%
Royalty and license fees	$60,692	$47,360	$13,332	28%

Royalty and license fees for the six months ended June 30, 2017 increased by $13.3 million compared to the six months ended June 30, 2016. The increase was primarily related to the receipt and recognition of $45.0 million of royalty and license fee payments under our patent license agreement with SDC compared to $37.5 million in the prior period, as well as to higher licensed sales from our customers.

Contract research services

Contract research services were as follows for the six months ended June 30, 2017 and 2016 (in thousands):

	Six Months Ended June 30, 2017	2016	Increase $	%
Contract Research Services	$3,922	$116	$3,806	3281%

Contract research services include revenue earned by our subsidiary, Adesis, which performs organic and organometallic synthetics research, development and commercialization on a contractual basis for our customer. Contract research services also include technology development and support revenue earned on government contracts, development and technology evaluation agreements and commercialization assistance fees, which includes reimbursement by the U.S. government for all or a portion of the research development expenses we incur related to our government contracts.

Contract research services revenue for the six months ended June 30, 2017 increased by $3.8 million compared to the six months ended June 30, 2016. The increase in contract research services revenue was related to contract research sales activities associated with Adesis, which was acquired on July 11, 2016.

Cost of material sales

Cost of material sold for the six months ended June 30, 2017 and 2016 were as follows (in thousands):

	Six Months Ended June 30, 2017	2016	Increase $	%
Material Sales	$93,465	$46,619	$46,846	100%

Cost of material sold	21,993	10,736	11,257	105 %
Gross margin on material sales	71,472	35,883	35,589	99 %
Gross margin as a % of material sales	76 %	77 %		

Cost of material sold for the six months ended June 30, 2017 increased by $11.3 million as compared to the six months ended June 30, 2016 and was primarily due to an increase in the level of material sales. As a result, gross margin on material sales for the six months ended June 30, 2017 increased by $35.6 million as compared to the six months ended June 30, 2016 with gross margin as a percentage of material sales declining to 76% from 77%, respectively.

Cost of commercial material sold for the six months ended June 30, 2017 and 2016 were as follows (in thousands):

	Six Months Ended June 30,		Increase	
	2017	2016	$	%
Commercial material sales	$66,677	$42,840	$23,837	56 %
Cost of commercial material sold	15,921	8,176	7,745	95 %
Gross margin on commercial material sales	50,756	34,664	16,092	
Gross margin as a % of commercial material sales	76 %	81 %		

32

Cost of commercial material sold for the six months ended June 30, 2017 increased by $7.7 million as compared to the six months ended June 30, 2016 and was primarily due to an increase in the level of commercial material sales. Gross margin as a percentage of commercial material sales for the six months ended June 30, 2017 increased by $16.1 million as compared to the six months ended June 30, 2016. The decrease in the gross margin as a percentage of commercial material sales was primarily due to unfavorable product mix and a decrease in the average selling prices per gram sold.

Cost of commercial material sold includes the cost of producing materials, shipping costs for such materials, and inventory write-downs, but excludes the cost of producing certain early development material. Depending on the amounts, timing and stage of production of materials, we expect the cost of commercial material sold to fluctuate from quarter to quarter.

Cost of development material sold for the six months ended June 30, 2017 and 2016 were as follows (in thousands):

	Six Months Ended June 30,		Increase	
	2017	2016	$	%
Development material sales	$26,788	$3,779	$23,009	609%
Cost of development material sold	6,072	2,560	3,512	137%
Gross margin on development material sales	20,716	1,219	19,497	
Gross margin as a % of development material sales	77 %	32 %		

Cost of development material sold for the six months ended June 30, 2017 increased by $3.5 million as compared to the six months ended June 30, 2016 and was due to the timing of emitters in the development cycle. In the six months ended June 30, 2017, we had several emitters that were in the latter stages of the development cycle prior to transitioning through commercial validation, compared to minimal such activity in the six months ended June 30, 2016. This resulted in higher material costs and improved gross margin as a percentage of development material sales in the six months ended June 30, 2017 as compared to the same six-month period in the prior year.

Research and development

Research and development expenses increased to $22.5 million for the six months ended June 30, 2017, as compared to $21.4 million for the six months ended June 30, 2016. The increase in research and development expenses was primarily due to higher third-party contract research services activities.

Selling, general and administrative

Selling, general and administrative expenses increased to $19.9 million for the six months ended June 30, 2017, as compared to $14.3 million for the six months ended June 30, 2016. The increase in selling, general and administrative expenses was primarily due to incremental costs associated with the addition of Adesis activity, as well as higher employee-related costs and other operating expenses.

Amortization of acquired technology and other intangible assets

Amortization of acquired technology and other intangible assets increased to $11.0 million for the six months ended June 30, 2017, as compared to $5.6 million for the six months ended June 30, 2016. The increase was due to higher amortization expense of $5.3 million associated with the acquisitions of the BASF patent portfolio and intangible assets associated with the Adesis acquisition.

Patent costs

Patent costs increased to $3.2 million for the six months ended June 30, 2017, as compared to $2.6 million for the six months ended June 30, 2016.

Royalty and license expense

Royalty and license expense increased to $4.6 million for the six months ended June 30, 2017, as compared to $2.8 million for the six months ended June 30, 2016. The increase was due to increased royalties incurred under our amended license agreement with Princeton, USC, and Michigan, resulting from an increase in qualifying material sales. See Note 8 in Notes to Consolidated Financial Statements for further discussion.

Interest income, net and other income (expense), net

Interest income, net was $1.5 million for the six months ended June 30, 2017, as compared to $1.0 million for the six months ended June 30, 2016. Other income (expense), net primarily consisted of net exchange gains and losses on foreign currency transactions. We recorded other expense of $13,000 for the six months ended June 30, 2017, as compared to other expense of $1.8 million for the three months ended June 30, 2016. Other expense for the 2016 period primarily consisted of exchange losses on foreign currency associated with the BASF OLED patent acquisition.

Income tax expense

On January 1, 2017, we adopted ASU No. 2016-09, Improvements to Employee Share-Based Accounting, which includes provisions intended to simplify various aspects related to how share-based payments are accounted for and presented in the financial statements. Under the previous guidance, tax effects of deductions for employee share awards in excess of compensation cost ("windfalls") were recorded in equity in the period in which the deductions actually reduced income taxes payable and any unrecognized tax benefits were tracked separately off the balance sheet. Under the new guidance, excess tax benefits and deficiencies are recorded in the income statement in the period in which stock awards vest or are settled, and any excess tax benefits not previously recognized because the related tax deduction had not reduced current taxes payable, are recorded through a cumulative-effect adjustment to retained earnings at the beginning of the period of adoption

We are subject to income taxes in both the United States and foreign jurisdictions. The effective income tax rate was 22.3% and 33.5%, for the six months ended June 30, 2017 and 2016, respectively, and the Company recorded income tax expense of $16.5 million and $12.0 million, respectively. The effective income tax rate for the six months ended June 30, 2017 reflected a benefit from the utilization of a valuation allowance at UDC Ireland.

Without the adoption of ASU No. 2016-09, for the six months ended June 30, 2017, the effective income tax rate and income tax expense would have been 24.8% and $18.4 million.

Liquidity and Capital Resources

Our principal sources of liquidity are our cash and cash equivalents and our short-term investments. As of June 30, 2017, we had cash and cash equivalents of $109.4 million and short-term investments of $256.1 million, for a total of $365.5 million. This compares to cash and cash equivalents of $139.4 million and short-term investments of $188.6 million, for a total of $328.0 million, as of December 31, 2016.

Cash provided by operating activities was $56.6 million for the six months ended June 30, 2017, compared to cash provided by operating activities of $36.2 million for the six months ended June 30, 2016. The increase in cash provided by operating activities of $20.4 million was due to an increase in net income of $33.8 million and an increase in non-cash adjustments to net income of $7.8 million, partially offset by an increase in cash used in operating assets and liabilities of $21.2 million primarily due to an increase in accounts receivable and inventory.

Cash used in investing activities was $75.6 million for the six months ended June 30, 2017, as compared to cash used in investing activities of $59.4 million for the six months ended June 30, 2016. The increase in cash used in investing activities of $16.2 million was primarily due to the timing of maturities and purchases of investments resulting in net purchases of $65.9 million for the six months ended June 30, 2017, as compared to net sales of $38.8 million for the six months ended June 30, 2016, as well as an increase in purchases of property, plant and equipment of $7.6 million, partially offset by the addition of intangible assets associated with the BASF OLED patent acquisition of $96.0 million purchased in the six months ended June 30, 2016. The increase in property, plant and equipment included the purchase of a previously leased manufacturing facility in Delaware by Adesis, as well as expansion of our OLED manufacturing capacity managed by our subcontractor, PPG, in Ohio.

Cash used in financing activities was $11.0 million for the six months ended June 30, 2017, as compared to $4.4 million for the six months ended June 30, 2016. The increase in cash used in financing activities of $6.6 million was due primarily to an increase in the payment of withholding taxes related to stock-based compensation to employees of $3.7 million as well as the cash payment of dividends in the current year of $2.8 million.

Working capital was $395.5 million as of June 30, 2017, compared to $345.2 million as of June 30, 2016. The increase in working capital was primarily due to an increase in accounts receivable and inventory, partially offset by an increase in accounts payable.

We anticipate, based on our internal forecasts and assumptions relating to our operations (including, among others, assumptions regarding our working capital requirements, the progress of our research and development efforts, the availability of sources of funding for our research and development work, and the timing and costs associated with the preparation, filing, prosecution, maintenance, defense and enforcement of our patents and patent applications), that we have sufficient cash, cash equivalents and short-term investments to meet our obligations for at least the next twelve months.

We believe that potential additional financing sources for us include long-term and short-term borrowings, public and private sales of our equity and debt securities and the receipt of cash upon the exercise of outstanding stock options. It should be noted, however, that additional funding may be required in the future for research, development and commercialization of our OLED technologies and materials, to obtain, maintain and enforce patents respecting these technologies and materials, and for working capital and other purposes, the timing and amount of which are difficult to ascertain. There can be no assurance that additional funds will be available to us when needed, on commercially reasonable terms or at all, particularly in the current economic environment.

Critical Accounting Policies and Estimates

The discussion and analysis of our financial condition and results of operations is based on our consolidated financial statements, which have been prepared in accordance with U.S. generally accepted accounting principles. The preparation of these financial statements requires us to make estimates and judgments that affect our reported assets and liabilities, revenues and expenses, and other financial information. Actual results may differ significantly from our estimates under other assumptions and conditions.

We believe that our accounting policies related to revenue recognition and deferred revenue, the valuation of certain investments, the valuation and recoverability of acquired technology and inventories, stock-based compensation, income taxes and our Supplemental Executive Retirement Plan, are our “critical accounting policies” as contemplated by the SEC.

Refer to our Annual Report on Form 10-K for the year ended December 31, 2016, for additional discussion of our critical accounting policies.

Contractual Obligations

Refer to our Annual Report on Form 10-K for the year ended December 31, 2016 for a discussion of our contractual obligations.

Off-Balance Sheet Arrangements

As of June 30, 2017, we had no off-balance sheet arrangements in the nature of guarantee contracts, retained or contingent interests in assets transferred to unconsolidated entities (or similar arrangements serving as credit, liquidity or market risk support to unconsolidated entities for any such assets), or obligations (including contingent obligations) arising out of variable interests in unconsolidated entities providing financing, liquidity, market risk or credit risk support to us, or that engage in leasing, hedging or research and development services with us.

ITEM 3. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

We do not utilize financial instruments for trading purposes and hold no derivative financial instruments, other financial instruments or derivative commodity instruments that could expose us to significant market risk other than our investments disclosed in “Fair Value Measurements” in Note 6 to the Consolidated Financial Statements included herein. We generally invest in investment grade financial instruments to reduce our exposure related to investments. Our primary market risk exposure with regard to such financial instruments is to changes in interest rates, which would impact interest income earned on investments. However, based upon the conservative nature of our investment portfolio and current experience, we do not believe a decrease in investment yields would have a material negative effect on our interest income.

Substantially all our revenue is derived from outside of North America. All revenue is primarily denominated in U.S. dollars and therefore we bear no significant foreign exchange risk.

ITEM 4. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

Our management, with the participation of our Chief Executive Officer and Chief Financial Officer, evaluated the effectiveness of our disclosure controls and procedures as of June 30, 2017. Based on that evaluation, the Chief Executive Officer and Chief Financial Officer concluded that our disclosure controls and procedures, as of the end of the period covered by this report, are effective to provide reasonable assurance that the information required to be disclosed by us in reports filed or submitted under the

Securities Exchange Act of 1934, as amended, is (i) recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms, and (ii) accumulated and communicated to our management, including the Chief Executive Officer and Chief Financial Officer, as appropriate to allow timely decisions regarding disclosure. However, a controls system, no matter how well designed and operated, cannot provide absolute assurance that the objectives of the controls system are met, and no evaluation of controls can provide absolute assurance that all control issues and instances of fraud, if any, within a company have been detected.

Changes in Internal Control over Financial Reporting

There were no changes in our internal control over financial reporting during the quarter ended June 30, 2017 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

PART II – OTHER INFORMATION

ITEM 1. LEGAL PROCEEDINGS

Patent Related Challenges and Oppositions

Each major jurisdiction in the world that issues patents provides both third parties and applicants an opportunity to seek a further review of an issued patent. The process for requesting and considering such reviews is specific to the jurisdiction that issued the patent in question, and generally does not provide for claims of monetary damages or a review of specific claims of infringement. The conclusions made by the reviewing administrative bodies tend to be appealable and generally are limited in scope and applicability to the specific claims and jurisdiction in question.

We believe that opposition proceedings are frequently commenced in the ordinary course of business by third parties who may believe that one or more claims in a patent do not comply with the technical or legal requirements of the specific jurisdiction in which the patent was issued. We view these proceedings as reflective of our goal of obtaining the broadest legally permissible patent coverage permitted in each jurisdiction. Once a proceeding is initiated, as a general matter, the issued patent continues to be presumed valid until the jurisdiction's applicable administrative body issues a final non-appealable decision. Depending on the jurisdiction, the outcome of these proceedings could include affirmation, denial or modification of some or all of the originally issued claims. We believe that as OLED technology becomes more established and as our patent portfolio increases in size, so will the number of these proceedings.

Below are summaries of certain active proceedings that have been commenced against issued patents that are either exclusively licensed to us or which are now assigned to us. We do not believe that the confirmation, loss or modification of our rights in any individual claim or set of claims that are the subject of the following legal proceedings would have a material impact on our materials sales or licensing business or on our consolidated financial statements, including our consolidated statements of income, as a whole. However, as noted within the descriptions, some of the following proceedings involve issued patents that relate to our fundamental phosphorescent OLED technologies and we intend to vigorously defend against claims that, in our opinion, seek to restrict or reduce the scope of the originally issued claim, which may require the expenditure of significant amounts of our resources. In certain circumstances, when permitted, we may also utilize the proceedings to request modification of the claims to better distinguish the patented invention from any newly identified prior art and/or improve the claim scope of the patent relative to commercially important categories of the invention. The entries marked with an "*" relate to our UniversalPHOLED® phosphorescent OLED technology, some of which may be commercialized by us.

Opposition to European Patent No. 1394870*

On April 20, 2010, Merck Patent GmbH; BASF Schweitz AG of Basel, Switzerland; Osram GmbH of Munich, Germany; Siemens Aktiengesellschaft of Munich, Germany; and Koninklijke Philips Electronics N.V., of Eindhoven, The Netherlands filed Notices of Opposition to European Patent No.1394870 (the EP '870 patent). The EP '870 patent, which was issued on July 22, 2009, is a European counterpart patent, in part, to U.S. patents 6,303,238; 6,579,632; 6,872,477; 7,279,235; 7,279,237; 7,488,542; 7,563,519; and 7,901,795; and to pending U.S. patent application 13/035,051, filed on February 25, 2011 (hereinafter the “U.S. '238 Patent Family”). They are exclusively licensed to us by Princeton, and we are required to pay all legal costs and fees associated with this proceeding.

An Oral Hearing was held before an EPO panel of first instance in Munich, Germany, on April 8-9, 2014. After the completion of the hearing, the panel decided that the broad claims originally issued did not satisfy EPO requirements and amended the claims to more narrowly define the scope of the claims. The '870 patent, in its amended form, was held by the panel to comply with the EPO requirements.

We believe the EPO's decision relating to the broad original claims is erroneous and have appealed the ruling to reinstate a broader set of claims. This patent, as originally granted by the EPO, is deemed valid during the pendency of the appeals process.

At this time, based on our current knowledge, we believe that the patent being challenged should be declared valid and that all or a significant portion of our claims should be upheld. However, we cannot make any assurances of this result.

Opposition to European Patent No. 1390962

On November 16, 2011, Osram AG and BASF SE each filed a Notice of Opposition to European Patent No. 1390962 (EP '962 patent), which relates to our white phosphorescent OLED technology. The EP '962 patent, which was issued on February 16, 2011, is a European counterpart patent to U.S. patents 7,009,338 and 7,285,907. They are exclusively licensed to us by Princeton, and we are required to pay all legal costs and fees associated with this proceeding.

The EPO combined the oppositions into a single opposition proceeding, and a hearing was held in December 2015, wherein the EPO Opposition Division revoked the patent claims for alleged insufficiencies under EPC Article 83. We believe the EPO's decision relating to the original claims is erroneous, and we have appealed the decision. This patent, as originally granted, is deemed valid during the pendency of the appeals process.

At this time, based on our current knowledge, we believe that the patent being challenged should be declared valid, and that all or a significant portion of our claims should be upheld. However, we cannot make any assurances of this result.

Opposition to European Patent No. 1933395*

On February 24 and 27, 2012, Sumitomo, Merck Patent GmbH and BASF SE filed oppositions to our European Patent No. 1933395 (the EP '395 patent). The EP ‘395 patent is a counterpart patent to the EP ‘637 patent, and, in part, to the U.S. Patents 7,001,536, 6,902,830 and 6,830,828 and to JP patents 4358168 and 4357781. This patent is exclusively licensed to us by Princeton, and we are required to pay all legal costs and fees associated with this proceeding.

At an Oral Hearing on October 14, 2013, the EPO panel issued a decision that affirmed the basic invention and broad patent coverage in the EP '395 patent, but narrowed the scope of the original claims.

On February 26, 2014, we appealed the ruling to reinstate a broader set of claims. The patent, as originally granted by the EPO, is deemed to be valid during the pendency of the appeals process. Two of the three opponents also filed their own appeals of the ruling. In January 2015, Sumitomo withdrew its opposition of the '395 patent, and the EPO accepted the withdrawal notice. The appeal proceedings were held in the second quarter of 2016. As a result of the proceedings, the board concluded the oral proceedings and proposed to reinstate a broader set of claims pending the resolution of a remaining question of the applicable law, a question that the board has deferred to the Enlarged Board of Appeals for review. The originally-granted claims remain in force during the pendency of this process.

In addition to the above proceedings and now concluded proceedings which have been referenced in prior filings, from time to time, we may have other proceedings that are pending which relate to patents we acquired as part of the Fujifilm patent or BASF OLED patent acquisitions or which relate to technologies that are not currently widely utilized in the marketplace.

ITEM 1A. RISK FACTORS

There have been no material changes to the risk factors previously discussed in Part I, Item 1A “Risk Factors” in our Annual Report on Form 10-K for the year ended December 31, 2016.

ITEM 2. UNREGISTERED SALES OF EQUITY SECURITIES AND USE OF PROCEEDS
Share Repurchases

During the quarter ended June 30, 2017, we acquired 50,630 shares of common stock through transactions related to the vesting of restricted share awards previously granted to our employees. Upon vesting, the employees turned in shares of common stock in amounts sufficient to pay the minimum statutory tax withholding at rates required by the relevant tax authorities.

The following table provides information relating to the shares we received and repurchased during the second quarter of 2017 (dollar amounts in thousands, other than per share amounts):

Period	Total Number of Shares Purchased	Weighted Average Price Paid per Share
April 1 - April 30	50,377	$ 84.08
May 1 - May 31	100	89.90
June 1 - June 30	153	110.65
Total	50,630	

ITEM 3. DEFAULTS UPON SENIOR SECURITIES
None.

ITEM 4. MINE SAFETY DISCLOSURES
Not applicable.

ITEM 5. OTHER INFORMATION
None.

38

ITEM 6. EXHIBITS

The following is a list of the exhibits filed as part of this report. Where so indicated by footnote, exhibits that were previously filed are incorporated by reference. For exhibits incorporated by reference, the location of the exhibit in the previous filing is indicated parenthetically, together with a reference to the filing indicated by footnote.

Exhibit Number	Description
31.1*	Certifications of Steven V. Abramson, Chief Executive Officer, as required by Rule 13a-14(a) or Rule 15d-14(a)
31.2*	Certifications of Sidney D. Rosenblatt, Chief Financial Officer, as required by Rule 13a-14(a) or Rule 15d-14(a)
32.1**	Certifications of Steven V. Abramson, Chief Executive Officer, as required by Rule 13a-14(b) or Rule 15d-14(b), and by 18 U.S.C. Section 1350. (This exhibit shall not be deemed “filed” for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, or otherwise subject to the liability of that section. Further, this exhibit shall not be deemed to be incorporated by reference into any filing under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended.)
32.2**	Certifications of Sidney D. Rosenblatt, Chief Financial Officer, as required by Rule 13a-14(b) or Rule 15d-14(b), and by 18 U.S.C. Section 1350. (This exhibit shall not be deemed “filed” for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, or otherwise subject to the liability of that section. Further, this exhibit shall not be deemed to be incorporated by reference into any filing under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended.)
101.INS*	XBRL Instance Document
101.SCH*	XBRL Taxonomy Extension Schema Document
101.CAL*	XBRL Taxonomy Extension Calculation Linkbase Document
101.DEF*	XBRL Taxonomy Extension Definition Linkbase Document
101.LAB*	XBRL Taxonomy Extension Label Linkbase Document
101.PRE*	XBRL Taxonomy Extension Presentation Linkbase Document

Explanation of footnotes to listing of exhibits:

* Filed herewith.

** Furnished herewith.

39

SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized:

	UNIVERSAL DISPLAY CORPORATION
Date: August 3, 2017	By: /s/ Sidney D. Rosenblatt Sidney D. Rosenblatt Executive Vice President, Chief Financial Officer, Treasurer and Secretary