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Strategic Directions International, Inc.

# INSTRUMENT BUSINESS OUTLOOK



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Strategic Information for the Analytical & Life Science Instrument Industry

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## Patent Litigation Review: NGS Settlements and New Suits

The first of *IBO's* biannual articles on patent litigation involving analytical instrument and lab product companies describes new suits regarding NGS, confocal microscopy and PCR, as well as new developments in suits involving Illumina and Thermo Fisher Scientific.

## New Suits

After filing a 2016 US International Trade Commission case (see [IBO 11/15/16](#)) against Oxford Nanopore for infringement of US Patent No. 9,404,146 (“Compositions and Methods for Nucleic Acid Sequencing,”), Pacific Biosciences this year initiated a case in the US District Court. In March, Pacific Biosciences filed suit against Oxford Nanopore in the US federal courts’ US District Court for Delaware. The suit alleges infringement of a patent (see table below) by Oxford Nanopore’s MinION and PromethION nanopore sequencing systems. The patent was issued in January. Oxford Nanopore has not yet filed an answer to the complaint. On its website, Oxford Nanopore labeled the suit frivolous and “brought by a competitor nervous about our superior technology.”

Pacific Biosciences has also filed suit against Oxford Nanopore in the UK (see [IBO 2/28/17](#)) and Germany, according to Oxford Nanopore’s website, both concerning European Patent No. 1192453 (“Molecular and Atomic Scale Evaluation of Biopolymers”).

In suit a concerning confocal microscopy, Omni Medsci filed suit against Leica Microsystems, a Danaher company, in March in the US District Court for the Northern District of Illinois (see table). The suit alleges infringement by Leica Microsystems’ TCS SP5 X and SP8 X confocal microscopes. The complaint requests damages, pre-issuance damages, and preliminary and permanent injunctive relief. In May, Leica Microsystems answered the complaint, denying infringement and filed counterclaims seeking to dismiss the patent and stating that there is no basis to the suit.

In April, Bio-Rad Laboratories filed suit in the US District Court for the District of Delaware against Thermo Fisher Scientific, alleging infringement of a 2017-issued patent (see table below). The patent is related to the thermal block configuration of Bio-Rad’s PCR systems, according to the complaint. Specifically, the complaint cites “an apparatus for performing polymerase chain reactions in a plurality of samples.” The complaint alleges infringement by the VeriFlex blocks used in Thermo Fisher’s QuantStudio 3 and 5 real-time PCR Systems, ProFlex PCR system, Veriti thermal cycler and StepOnePlus PCR system. Bio-Rad is seeking compensatory damages. Thermo Fisher has not yet filed a reply.

## Older Suits

In a suit filed in 2016 in US District Court for the Central District of Utah, BioFire Defense, a bioMerieux company and the University of Research Foundation alleged infringement of two PCR patents (see table) by Fluidigm. The complaint alleges direct, induced and contributory infringement. The plaintiff requests lost profits or a royalty as compensation.

Selected New US Patent Infringement Cases among Instrument and Lab Product Companies				
Plaintiff	Defendant	US Patent No.	Patent Title	Case Filed
Bio-Rad Laboratories	Thermo Fisher Scientific	9,623,414	"Localized Temperature Control for Spatial Arrays of Reaction Media"	4/25/17
Omni Medsci	Leica Microsystems	9,476,769	"Broadband or Mid-Infrared Fiber Light Sources"	3/14/17
Pacific Biosciences	Oxford Nanopore	9,546,400	"Nanopore Sequencing Using N-mers"	3/15/17

*Click to enlarge*

## Settlements

Another suit involving the same companies (see [IBO 5/15/16](#)) has been administratively closed as of April, pending a USPTO *inter partes* review initiated by Thermo Fisher in October 2016 seeking cancellation of certain patent claims.

Thermo Fisher is the plaintiff in a case filed in November 2016 that has since been dismissed. Thermo Fisher’s filed suit in the US District of Massachusetts against molecular spectroscopy maker DeNovix in November 2016. The

complaint alleged infringement by DeNovix's DS-11 spectrophotometers of two patents (US Patent Nos. 6,628,382 and 6,809,826 for "Liquid Photometer Using Surface Tension to Contain Sample") covering Thermo Fisher's NanoDrop micro-volume spectrophotometers. The case was dismissed in March, with the court stating the complaint was "deemed to be unserved."

Two other cases also involve Thermo Fisher. Last month, Roche's (454 Life Sciences) infringement suit against Thermo Fisher involving emulsion PCR (see [IBO 7/15/15](#)) was dismissed with prejudice at the request of both parties. The counterclaims brought by Thermo Fisher were dismissed without prejudice. A 2016 *inter partes* proceeding before the US Patent and Trademark Office regarding the validity of the patent claims under dispute was terminated in April, as the parties submitted a settlement and license agreement.

In April, plaintiffs Cornell University and Thermo Fisher (Applied Biosystems), and defendant Illumina jointly stipulated to the dismissal without prejudice of a 2010 patent infringement suit related to Illumina's GoldenGate Genotyping Assay and DASL (cDNA-mediated Annealing, Selection, Extension and Ligation) Assay (see [IBO 9/30/10](#)). The trial was scheduled for this summer.

## Updates

Claims of infringement of 1 of 6 patents under dispute in RainDance Technologies and the University of Chicago's 2015 patent infringement suit against 10x Genomics (see [IBO 4/30/15](#)) have been dismissed. In March, the parties requested the dismissal with prejudice of the claims related to RainDance's US Patent No. 8,658,430 ("Manipulating Droplet Size"). The patent was added to the case as part of an amended complaint.

In *inter partes* review brought by 10x Genomics, the USPTO Patent Trial and Appeal Board concluded in January that claims 1-17 of the patent were unpatentable as obvious. However, RainDance also won a round at the USPTO. In November 2016, the USPTO found in a separate *inter partes* review of US Patent Number 8,889,093 ("Device and Method for Pressure-Driven Plug Transport and Reaction") that 10x had not proved the selected claims were unpatentable.

US Patent No. 8,273,573 ("Method or Obtaining a Collection of Plugs Comprising Biological Molecules") was removed from the amended complaint and removed from the US PTO *inter partes* review per the patent holder's request.

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## US FY2017 Budget: Science R&D Increases

Despite the Trump Administration's proposals to cut US science funding over the last few months, the [2017 Consolidated Appropriations Act](#), or omnibus bill, indicates a 5.0% rise in total FY17 science R&D to \$155.8 billion, according to [recent estimates](#) from the American Association for the Advancement of Science (AAAS). Signed into law on [May 5](#), the \$1.07 trillion bill is 1.3% higher than the Administration's requested amount, and a 7.0% decrease from FY16 (see [IBO 12/31/15](#)). The AAAS estimates that basic research funding increased 4.1% to \$34.9 billion, while applied research funding increased 6.3% to \$40.2 billion. R&D funding estimates for development rose 4.0% to \$78.1 billion, and facilities and equipment funding increased an estimated 2.9%, totaling \$2.7 billion. Funding for defense and nondefense R&D is estimated to have grown by 6.3% to \$82.9 billion and 3.6% to \$72.9 billion, representing 53% and 46% of total FY17 science R&D, respectively.

The information in this article is the result of **IBO** estimates, unless otherwise indicated. The estimates for FY17 are based on Congressional documents, White House explanatory statements and Appropriations Committee press releases.

Selected US FY17 AAAS Estimated R&D Budget Figures		
	FY17 (\$M)	Change
<b>USDA</b>	<b>\$20,900</b>	<b>N/A</b>
Agricultural Research Service	\$1,170	2.3%
National Institute of Food and Agriculture	\$869	3.7%
Agriculture and Food Research Initiative	\$175	7.1%
Construction of Research Facilities	\$100	-53.0%
<b>Dept. of Commerce</b>	<b>\$1,813</b>	<b>-4.8%</b>
NIST	\$775	0.2%
Sci. and Tech. Research and Services	\$630	-30.0%
<b>DOE</b>	<b>\$15,958</b>	<b>10.9%</b>
Office of Science	\$5,344	0.7%
Energy Efficiency and Renewable Energy	\$1,523	8.0%
Advanced Research Projects-Energy	\$306	5.2%
<b>NIH</b>	<b>\$32,802</b>	<b>7.1%</b>
National Cancer Institute	\$5,689	9.1%
General Medical Sciences	\$2,651	5.5%
Office of the Director	\$1,730	10.1
National Ctr. for Advancing Transl. Sci.	\$706	3.0%
<b>EPA</b>	<b>\$494</b>	<b>-3.8%</b>
Clean Water State Revolving Fund (incl. non-R&D)	\$1,394	0.0%
Drinking Water State Revolving Fund (incl. non-R&D)	\$863	0.0%
Science and Technology Programs	\$477	-3.3%
<b>NSF</b>	<b>\$6,051</b>	<b>-1.1%</b>
Research and Related Activities	\$5,411	-1.4%

*Click to enlarge*

## NIH

The NIH received a total FY17 budget of \$34.1 billion, a 6.2% increase. The \$2 billion increase includes funding for the 21<sup>st</sup> Century Cures Act (see [IBO 1/4/17](#) and [IBO 1/18/17](#)). Similarly to FY16, the budgets of virtually all institutes within the NIH received increases. General Medical Sciences received \$1.8 billion, a 3.9% increase, while Environmental Health Sciences' budget increased 3.0% to \$714.3 million. Also increasing 3.0% from FY16 are the budgets for Biomedical Imaging and Bioengineering at \$357.1 million, and Complementary and Integrative Health funding at \$134.7 million. The BRAIN Initiative budget increased \$110 million to \$260 million, a 73.3% increase, while Precision Medicine Initiative funding jumped 60%, or \$120 million, to \$320 million.

According to AAAS estimates, NIH R&D funding accounts for \$32.8 billion, or 96%, of the Institute's budget, with \$32.6 billion allocated to the conduct of R&D, and \$168 million for R&D facilities and equipment. The estimated AAAS budgets for NIH Buildings and Facilities and the Environmental Health Sciences Superfund remain stationary at \$129 million and \$77 million, respectively.

## FDA

The total budget for the FDA for FY17 increased by \$39 million, or 1.5%, to \$4.8 billion, with \$2.8 billion in new discretionary budget authority and \$1.9 billion in definite user fees. The budget includes a general \$10 million provision for the prevention of and response to emerging threats to human health, such as the Ebola and Zika viruses.

The law also provided \$33.7 million for the implementation of the Food Modernization Safety Act (FSMA), of which \$18.7 million is for the National Integrated Food Safety System and \$17.0 million is for Import Safety.

The budget authority for Animal Drugs and Feeds increased 2.6% to \$162.9 million, and the Center for Drug Evaluation and Research budget decreased 27.6% to \$356.0 million, although funding for its parent program,

Human Drugs, overall increased marginally by 0.1% to \$492.2 million. Funding for Biologics, which includes the Center for Biologics Evaluation and Research and Field Activities, remained stationary at \$215.4 million.

## CDC

The CDC received a total of \$6.3 billion, with the vast majority of the budget for discretionary funding, and \$15 million for the Public Health and Social Services Emergency Fund. Funding for Environmental Health decreased 2.4% to \$180.8 million, which includes \$163.8 million for discretionary funding and \$17 million for transfers from the Public Health Fund.

Selected US Federal FY17 Budget Figures		
	FY17 (\$M)	Chg.
<b>DHHS</b>	<b>\$646,478.7</b>	<b>6.2%</b>
<b>CDC</b>	<b>\$7,255.2</b>	<b>0.3%</b>
<b>FDA</b>	<b>\$4,725.4</b>	<b>1.5%</b>
Ctr. for Food Safety and App. Nutrition	\$311.0	2.3%
<b>NIH</b>	<b>\$34,084.0</b>	<b>6.2%</b>
Nat'l Cancer Inst.	\$5,389.3	3.3%
Office of the Director	\$1,665.2	6.0%
Nat'l Ctr. for Adv. Translational Sci.	\$706.0	3.0%
Nat'l Human Genome Rsch. Inst.	\$528.6	1.8%
<b>DOE</b>	<b>\$30,746.0</b>	<b>3.5%</b>
Office of Science	\$5,392.0	0.8%
Energy Efficiency and Renew. Energy	\$2,090.2	0.8%
ARPA-Energy	\$306.0	5.2%
<b>EPA</b>	<b>\$8,058.5</b>	<b>-1.0%</b>
Science and Tech.	\$706.5	3.8%
<b>NIST</b>	<b>\$954.0</b>	<b>1.2%</b>
Sci. and Tech. Rsch. and Svcs.	\$690.0	0.0%
<b>NSF</b>	<b>\$7,472.2</b>	<b>0.1%</b>
<b>USDA</b>	<b>\$153,907.9</b>	<b>8.6%</b>
Nat'l Inst. of Food and Ag.—Research and	\$1,362.9	66.3%
Agricultural Research Service	\$1,270.0	-6.3%
Food Safety and Inspection Svc.	\$1,032.1	1.7%
Foods	\$1,025.5	3.9%

*Click to enlarge*

## NSF

The NSF total budget grew a meager 0.1% to \$7.5 billion. Of this figure, 80%, or \$6.0 billion, is allocated for research and related activities, which includes \$160 million for the Experimental Program to Stimulate Competitive Research, the same budget as FY16. Major Research Equipment and Facilities Construction received \$209 million, up 4.3%, while the Office of the National Science Board's budget remained flat at \$4.4 million.

AAAS estimates indicate that NSF Conduct of R&D funding totals \$5.6 billion, a 1.8% decrease, while R&D Facilities received \$463 million, a 9.1% increase.

## DoE

Funding for the DoE grew 3.5% to \$30.8 billion for its science, energy, environment and national security programs. The budget for the Office of Science remained mostly flat at \$5.4 billion, with marginal increases for many of its

departments, such as the budget for Energy Efficiency and Renewable Energy, which increased only 0.8% to \$2.1 billion, and High Energy Physics research, which received \$731.5 million, up just 0.3%. The budget for Basic Energy Sciences research grew 2% to \$1.7 billion, while Biological and Environmental Research grew 0.5% to \$612 million. Science Laboratories Infrastructure, which includes infrastructure support, facilities and construction, received a 14% boost to \$130 million.

According to AAAS estimates, DoE R&D funding totals \$16.0 billion, with \$14.9 billion for Conduct of R&D and \$1.1 billion for R&D Facilities. By function, the AAAS estimates that the R&D budgets for Defense, General Science and Energy are \$7.1 billion, \$5.3 billion, and \$3.5 billion, respectively.

## **EPA**

The EPA's funding decreased by 1.0% to \$8.1 billion. The budgets for the vast majority of programs and departments within the Agency either remained flat or decreased for FY17. The EPA's Science and Technology department received \$713.8 million, which was partially offset by a \$7.4 million rescission, for a total of \$706.5 million, a 3.8% decrease.

The budget for Clean Air and Climate and Chemical Safety and Sustainability remained frozen at the FY16 levels of \$116.5 million and \$125.9 million, respectively. Funding for Water Resources grew 1.9% to \$214.8 million. State and Tribal Assistance grants nominally increased 0.3% to \$3.5 billion, although Categorical grants, a sub-category within State and Tribal Assistance grants, decreased 1.4% to \$1.1 billion.

AAAS estimates indicate that total EPA R&D funding decreased 3.8% to \$494 million, with only Oil Spill Response receiving an increase in budget, with \$1 million, a 3.6% growth.

## **NIST**

The Department of Commerce's NIST total budget decreased 1.2% to \$952 million, with \$690 million allocated to Scientific and Technological Research and Services, the same figure as FY16. The law indicated \$109 million for the construction of research facilities, down 8.4%, and \$153 million for Industrial Technology Services, a 1.3% decrease. Within Industrial Technology Services, the budget for the National Network for Manufacturing Innovation remained flat at \$25 million.

The AAAS estimates that for the entire Department of Commerce, R&D budgets have decreased 4.8% to \$1.8 billion, a \$92 million decrease.

## **USDA**

The USDA received a \$12.8 billion boost for its FY17 budget, totaling \$153.4 billion, an 8.6% increase. This includes \$2.9 billion for agricultural research programs, such as the Agricultural Research Service, which received \$1.3 billion, and the National Institute of Food and Agriculture, which received \$1.4 billion. Animal and Plant Health received an additional \$51.8 million in its budget for a total of \$949 million, and an extra \$17.2 million for the Food Safety and Inspection Service, totaling \$1.0 billion.

R&D funding for the Agricultural Research Service decreased 6.2% to \$1.3 billion, according to AAAS estimates, while R&D funding for the National Institute of Food and Agriculture increased 3.7% to \$869 million. Including Forest Services, AAAS estimates of total USDA R&D funding is \$2.6 billion, down 2.9% from FY16.

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# **Spring 2017 IBO Business Climate Survey: Doubts Remain**

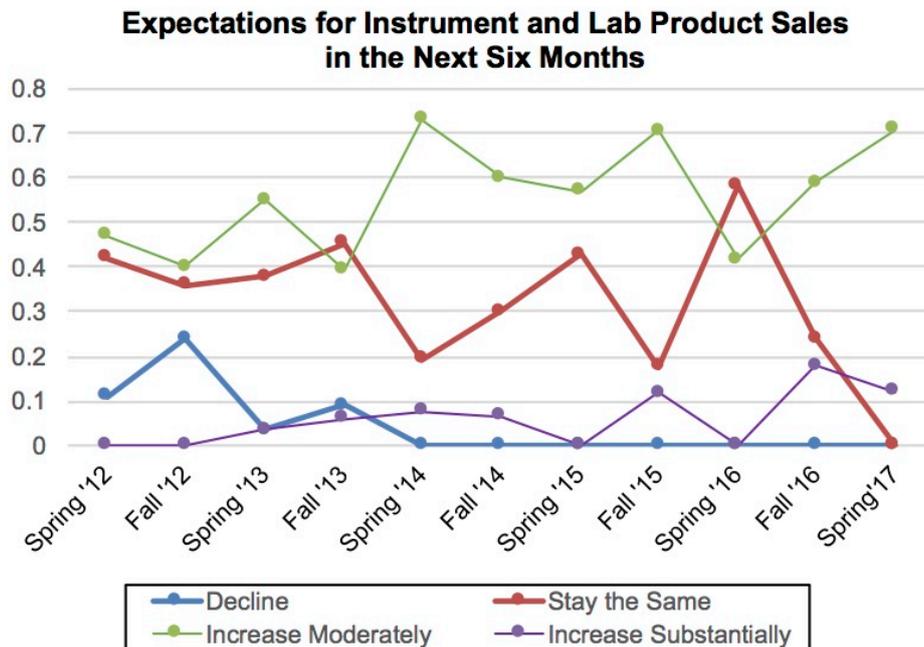
The latest **IBO** Business Climate Survey shows overall optimism for instrument and lab product sales for the next six months but also indicates areas of concern, especially around certain end-markets. The survey was conducted by email the weeks of May 1 and 8. Surveys were sent to **IBO** subscribers, as well as other instrument and lab product company executives who opted to take the survey in return for a complimentary issue of **IBO**. There were a total of 17 respondents.

Duke and *CFO Magazine's* quarterly "Global Business Outlook" Survey surveys senior financial executives and *CFO* subscribers at both public and private companies. The latest survey, conducted in March, showed increased optimism. Results for R&D and capital spending plans are shown in the table below.

	Avg. Expected Changes in Next 12 Months	
	Capital Spending	R&D Spending
363 US Firms	5.8%	4.0%
31 Canadian Firms	2.8%	2.0%
185 European Firms	6.7%	3.9%
53 African Firms	21.0%	2.6%
154 Latin American Firms	1.8%	3.0%
109 Asian Firms (excl. Japan and China)	12.7%	3.9%
25 Chinese Firms	1.4%	6.2%
30 Japanese Firms	19.9%	2.2%

[Click to enlarge](#)

Such optimism was also evident in *IBO's* survey. Over 70% of executives surveyed by *IBO* expect instrument and lab product sales to increase moderately in the second and third quarter. This is a healthy increase from the 59% in the fall 2017 survey (see [IBO 10/31/16](#)), perhaps owing to the completed elections in the US and France. As usual, no respondent expected sales to decline.



[Click to enlarge](#)

It is widely acknowledged that the election of Donald Trump as US president has brought increased uncertainty regarding a number of issues, especially federal spending on science, environmental regulations, and economic and political policies. To gauge the perception of his election on the industry's outlook, survey respondents were asked to rate the effect of President Trump's election on the instrument and lab product industry's financial health and stability. According to the results, there is not much enthusiasm. On a scale of 1 to 5, with 1 indicating an overall negative effect and 5 indicating an overall positive effect, 65% of respondents rated the effect as a 2, while 24% rated it as a 3.

Asked to state the reasons for this effect, many respondents noted the uncertainty created by the Administration’s statements and actions regarding federal science funding and policy. Others noted the general level of uncertainty, citing possible negative economic and geopolitical ramifications. “He is causing uncertainty around the world, which will make managers more cautious and less likely to commit to capital purchases,” stated one survey participant. Some respondents commented on possible mixed effects, noting President Trump’s pro-business policies on the one hand, but the the possibility of a decrease in public research funding on the other. Others expect to benefit from the Administration’s pro-business stance. As one executive put it, “Negative effects on public funding will likely be offset by modestly stronger private sector performance. As our company relies more on the private sector, I expect the effect to be neutral.”

### Ranking of End-Market Challenges (1 = Least Pressing, 5 = Most Pressing)



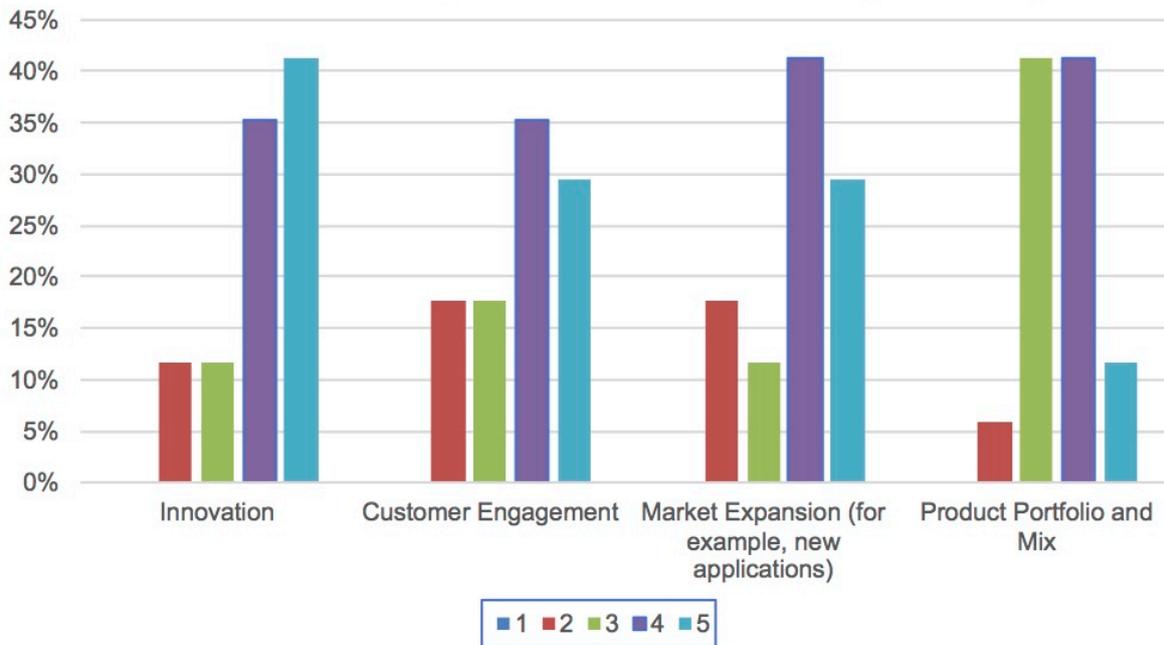
[Click to enlarge](#)

Surveyed executives were then queried about end-market challenges. They were asked to rank, on a scale of 1 to 5, with 1 being the “least pressing challenge” on the list and 5 being the “most pressing challenge” on the list, five current market challenges. As the graph below illustrates, the highest number of rankings of 5 belonged to “uncertain government and academic spending in the US,” followed closely by “pricing pressure.” Surprisingly, the highest number of respondents ranked “uncertain government and academic spending outlook in Europe” as the least pressing challenge. The good news: no respondent ranked “weakness in end-markets” as a 5, and nearly half of respondents ranked it as the least pressing.

As instrument and lab product companies refine and implement strategies in response to changing market conditions, **IBO** sought to understand just how influential four strategies for growth—customer engagement, innovation, market expansion, and product portfolio and mix—are perceived by industry executives. **IBO** asked respondents to rate the strategies on a scale of 1 to 5, with 5 indicating “extremely influential” and 1 indicating “no influence.”

As the graph below indicates, “Innovation” was the only category for which the highest percentage of respondents rated a 5. For the three other strategies, the highest percentage of respondents rated them a 4. The distribution of ratings by respondents among all four strategies suggests that no one strategy can be considered a primary driver.

### Influence of Selected Business Strategies on Instrument and Lab Product Companies (1 = No Influence, 5 = Extremely Influential)



[Click to enlarge](#)

Asked to rate the prospects for their companies’ instrument and lab product sales regionally for the next six months on a scale of 1 to 5, with 1 being “declining growth,” 3 being “stable growth” and 5 being “improving growth,” China and India, as in the fall 2016 survey, were once again the highest rated among the nine regions and countries. As in the fall 2016 survey, China was the only country to receive an average rating of 4 or above.

But China, along with North America and Japan, recorded notable declines in average ratings compared to last fall. Japan’s average rating dropped a full percentage point, while North America was down five-tenths of a percentage point and China was down four-tenths of a percentage point. Surprisingly, no country or region showed a notable upward swing in average rating. The average rating for all categories was 3.5, in line with the majority of respondents’ expectations of overall moderate growth in response to the survey’s initial questions.

### Avg. Ratings of Expected Instrument and Lab Prod. Sales Growth in Next Six Months by Geography (1 = Declining, 5 = Improving)



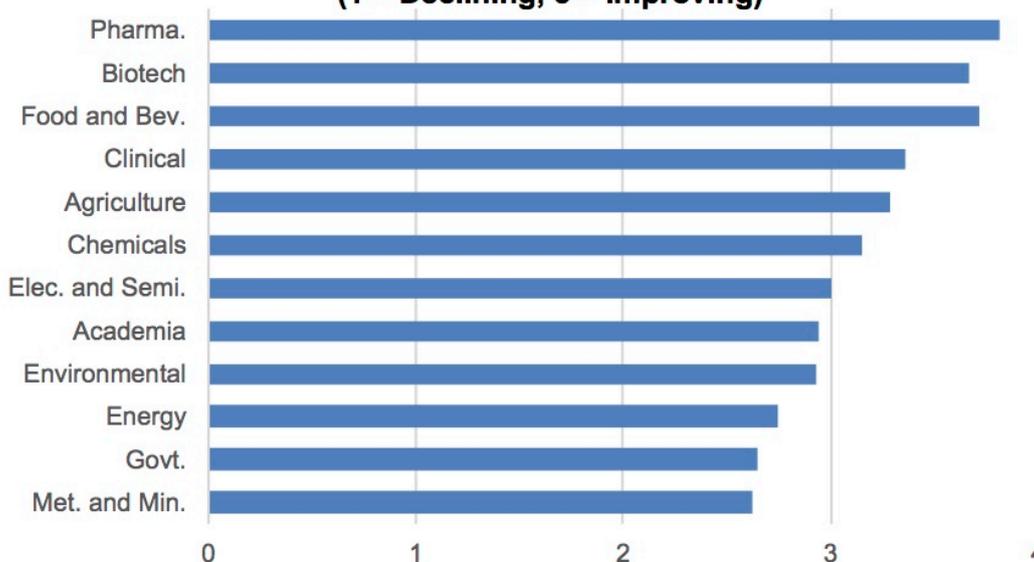
[Click to enlarge](#)

Respondents were also asked to rate on the same scale the prospects for their companies’ instrument and lab

product sales for the next 6 months for 12 end-markets. In contrast to the geographic ratings, there were major changes in average ratings compared to last fall.

Biotechnology was the only category from last fall to remain within the top three, yet its average rating declined, falling three-tenths of a percentage point. In fact, it was 1 of 6 end-markets showing a notable decline compared to last fall. Average ratings for the environmental market suffered the steepest decline, dropping seven-tenths of a percentage point. The average ratings for energy and government each fell six-tenths of a percentage point. Even the average rating for the clinical market declined, dropping five-tenths of a percentage point. The only end-market to show an increase in average rating, and a quite dramatic one, was semiconductor and electronics for which the average rating increased a full percentage point to 3.0.

**Avg. Ratings of Expected Instrument and Lab Product Sales Growth in Next Six Months by End-Market (1 = Declining, 5 = Improving)**



*Click to enlarge*

Overall, no end-market received an average rating above 3.8, and five end-markets were rated on average below 3.0. The average rating for all end-markets was 3.1.

Finally, respondents were asked what they believe to be the greatest threat to analytical instrument and lab product instrument sales growth over the next six months. The free text question elicited a range of responses. A number of answers cited uncertainty, ranging from academic and government research outlooks to political and economic stability. Specifically, respondents cited NATFA, Brexit, and political instability in Europe as political and economic threats. A number of respondents cited NIH cuts and budget cuts in general.

## First Quarter Financial Results: Illumina, PerkinElmer, QIAGEN, Thermo Fisher Scientific and Waters

CY Q1 2017 Results									
Company	Revenues			Rev. Growth Summary			Adj. Operating Profit		
	Rev. (M)	% of Co. Rev.	Growth	Curr.	Acq./Div.	Org. Growth	(M)	% Growth	
Illumina	\$598.0	100%	4.5%	0%	0%	5%	\$136.6	-24.1%	
PerkinElmer	\$514.3	100%	3.2%	-1%	0%	4%	\$84.1	3.6%	
QIAGEN	\$308.3	100%	3.3%	-2%	2%	3%	\$63.8	17.1%	
Thermo Fisher Scientific	\$4,765.0	100%	10.9%	-1%	8%	4%	\$1,075.8	15.7%	
Waters	\$498.0	100%	4.8%	-1%	0%	6%	\$134.9	7.1%	

*Click to enlarge*

## illumina Reveals Strength for New Platform

As the company transitions to its new high-throughput sequencing system, first quarter sales for illumina grew slightly above company expectations, climbing 4.6% to \$598 million. While initial demand for its new NovaSeq system was encouraging, profit margin was negatively impacted by increased investments and higher production costs.

Orders for the new NovaSeq system exceeded company expectations at more than 135 units. Previous HiSeq X customers accounted for roughly one-third of these orders, which included several multi-unit transactions. During the quarter, the company manufactured and installed 25 NovaSeq units, capping capacity expectations.

In spite of these positive developments, total sequencing sales grew only 2% due to lower HiSeq placements and transition to the NovaSeq platform. Consequently, sequencing instrument sales contracted 17%. Despite muted expectations, the company placed more than 10 HiSeq systems, as a result of certain customer capacity requirements. In addition, sales of benchtop systems remained healthy, including continued demand for NextSeq from NIPT customers in China. MiniSeq and MiSeq sales were also sturdy, driven by demand from new-to-sequencing customers, which accounted for roughly 60% of placements for these systems.

Sales of sequencing consumables improved 7%, roughly in line with company consensus. However, unitization rates for HiSeq systems slowed at a slightly higher-than-expected rate as customers ran down existing inventories. Sequencing services revenue grew roughly 10%.

illumina Q1 FY17			
	Rev. (\$M)	% Rev. Growth	% of Rev.
Consumables	\$387	7%	65%
Instrument	\$100	-15%	17%
Other Products	\$4	0%	1%
Service & Other	\$107	20%	18%

*Click to enlarge*

Microarray sales grew 17% to just over \$100 million, driven by strong genotyping consumer demand as well as oncology testing applications, especially for commercial molecule diagnostics and translational liquid biopsy. Array sales to consumer and oncology customers grew 40% and 20%, respectively.

Geographically, sales in Asia Pacific climbed 15%, driven by strength in China, for which shipments advanced more than 35%. This growth was partially offset by lower genomics funding in Japan. Sales in the Americas expanded 4%, but declined 2% in Europe.

illumina adjusted gross margin fell 490 basis points to 66.4% due to lower sales of sequencing instrumentation, product mix and manufacturing ramp up of the NovaSeq. Given the lower margins, and higher R&D and marketing expenses, adjusted operating margin contracted more than six percentage points to 17.6%.

Sales growth is expected to accelerate towards the second half of the year due to increased deliveries and consumable pull-through for NovaSeq. The company maintained its 2017 sales growth outlook of 10%-12% and projected second quarter sales to grow 7%. Currency headwinds are expected to reduce full-year sales growth by 1%.

## Diagnostics and New Products Lift PerkinElmer

First quarter financial results for PerkinElmer outshined company expectations, as sales advanced 3.2%, 4% organically, to \$514.3 million (see [Bottom Line](#)). Currency reduced sales growth by 1%, while acquisitions, net of divestments, added roughly 0.5%.

The company again highlighted its four key business areas (reproductive health, emerging market diagnostics, food

and biopharmaceutical services) for which combined sales grew in the high single digits to account for just under 50% of revenues. However, demand in the remaining businesses were relatively muted, as stronger environmental sales were mostly offset by weakness in the core industrial, and academic and government markets.

Discovery & Analytical Solutions (DAS) sales improved 2% organically to account for 70% of revenues. This growth was driven by new products and strong service revenues, which grew in the mid-teens. From a market perspective, biopharmaceutical sales advanced in the mid-single digits, led by strength in OneSource, as well as healthy demand for imaging products and reagents, especially in China. However, radiochemical sales continued to decline.

Following three consecutive quarters of declining sales, environmental sales expanded in the high single digits, led by demand for the new ICP-MS system, as well as increased regulatory measures in emerging markets. Food sales grew in the mid-single digits due to double-digit sales growth in the Pertent bacterial testing business.

Industrial sales were flat but grew on a sequential basis. In addition, orders for the industrial market improved.

PerkinElmer Q1 FY17						
	Rev. (M)	% of Rev.	Rev. Growth	Curr.	Acq.	Org. Growth
Discovery & Analytical Solutions	\$361.8	70%	1.5%	-1%	0%	2%
Diagnostics	\$152.5	30%	7.6%	-1%	0%	8%

*Click to enlarge*

Academia and government sales contracted in the low single digits, including a mid- to high-single digit decline in the US and lower sales in Asia Pacific. Conversely, European academic and government sales advanced.

Diagnostics sales climbed 8% to represent 30% of revenues. This growth was driven by strength in the newborn screening and infectious disease businesses, as well as more than 20% sales growth in China. The oncology-related business, which primarily consists of NGS workflow solutions, grew in the mid-single digits, with strength in Europe and Asia.

Geographically, organic sales grew in high teens in Asia and low single digits in Europe. Sales in the Americas contracted in the low single digits. Demand in emerging markets remained robust, as combined sales in Brazil, Russia, India and China climbed more than 20% organically.

Adjusted gross profit margin slipped 48 basis points to 48.4% due to acquisitions and divestment. Adjusted operating margin was roughly unchanged at 16.3%, as improved margins in the Diagnostics segment was offset by increased investment in DAS.

The company modestly raised its 2017 sales outlook from \$2.19-\$2.20 billion to \$2.20-\$2.22 billion, but maintained its organic sales growth rate of 4%. The company expects roughly \$50 million in sales from new products in 2017. Second quarter organic sales are expected to grow 3%-4% to \$550-\$555 million.

## **Diagnostics and Forensics Support QIAGEN Growth**

QIAGEN's first quarter organic sales, which advanced 3% to \$308.3 million (see [Bottom Line](#)), topped company expectations due to timing of forensic orders, as well as robust sales growth for QIASymphony and QuantiFERON latent TB tests. Acquisitions contributed 2% to revenue growth but were offset by currency headwinds of 2%. Growth was again tapered by declining US HPV sales, which reduced sales growth by 2%.

All financial figures below are based on currency-neutral sales and include acquisitions. Sales of consumables and other related products, which accounted for 89% of revenues, climbed 7%, including double-digit sales growth for QIASymphony, QuantiFERON and NGS consumables each. Representing the remaining 11% of revenues, instrument sales contracted 3% due to cautious spending by pharmaceutical and academic customers. However, instrument sales grew in both the Molecular Diagnostics and Applied Testing segments. In addition, the company noted a positive uptake for the automated QIASymphony and GeneReader NGS systems.

Life sciences-related sales grew 8% excluding currency, roughly 5% organically, to account for 54% of revenues. Applied Testing sales grew roughly 21% due to a weak comparison, as well as timing of orders for new human ID forensics products.

Despite lower instrumentation demand, Pharma sales climbed 8% due to strong double-digit sales growth for consumables and related products, as well as contributions from acquisitions.

QIAGEN Q1 FY17						
	Rev. (M)	% of Rev.	Rev. Growth	Rev. Growth (Ex. Curr.)	Org. Growth (Est.)	
Molecular Diagnostics	\$142	46%	0%	3%	2%	
Academia	\$74	24%	2%	3%	1%	
Pharma	\$64	21%	5%	8%	5%	
Applied Testing	\$29	9%	19%	21%	17%	

*Click to enlarge*

While Academia sales advanced 3%, growth was primarily supported by acquisitions. Instrumentation demand for this market was particularly weak, especially in Europe.

Molecular Diagnostics sales grew 3%, 6% excluding US HPV revenues. Demand was particularly strong for infectious disease and tuberculosis testing products. Companion diagnostic co-development sales, which accounted for only a small portion of segment revenue, grew 11%. Conversely, the company noted lower HPV sales outside of the US.

Overall, sales climbed 10% in the Asia-Pacific/Japan region to make up 21% of revenues. This increase was driven by strong double-digit growth in South Korea, while Japanese sales advanced in the low single digits. Accounting for 46% of revenue, sales in the Americas expanded 3%, 6% excluding US HPV revenue. Within the Americas, sales grew double digits in Brazil, as well as single digits in the US and Mexico each. Representing 33% of revenue, sales in the Europe/Middle East/Africa region grew 7%, including double-digit sales growth in Turkey and improved demand in Germany and the UK, but a decline in the Middle East due to timing of orders.

QIAGEN adjusted gross margin expanded 100 basis points to 70.6% primarily due to product mix. Adjusted operating margin advanced 250 basis points to 20.7%, driven by restructuring and cost saving measures.

The company maintained its full-year currency-neutral sales growth forecast of 6%–7%, including 5%–6% organic growth. Second quarter sales are projected to grow 5%–6% excluding currency, or 3%–4% organically.

## Thermo Fisher Scientific Reports Confident Outset

Thermo Fisher Scientific started the year on a strong note as sales climbed 10.9%, 4.2% organically, to \$4.77 billion. Acquisitions added 8.0% to sales growth, which included a stronger-than-expected contribution from FEI (see [IBO 8/15/16](#)) due to robust cryo-EM demand. Meanwhile, currency headwinds were less impactful than projected, reducing sales growth by only 1.3%. Organic growth also topped expectations, as a result of continued strength in biopharmaceutical markets and demand in China.

All end-market and geographic figures below are based on organic growth. Biopharmaceutical sales climbed roughly 9%, led by continued strength for bioproduction, biosciences, chromatography and MS products. Sales to health care and diagnostics, as well as academic and government customers improved in the low single digits each. Academic and government sales were healthy in Asia Pacific, but grew modestly in the US. Industrial and applied sales advanced 4%, driven by strong food testing and environmental applications. Industrial demand progressed, driven by increased sales growth in the research and safety market channels, and lower-priced instrumentation. Further, orders for long-cycle products from industrial customers grew for the second consecutive quarter.

Life Science Solutions sales climbed 7% with particular strength for bioproduction, bioscience and NGS products

and, to a lesser degree, positive sales within the genetic sciences business.

Thermo Fisher Scientific Q1 FY17				
	Rev. (M)	% Total Rev.	% Rev. Growth	% Org. Growth
Life Sciences Solutions	\$1,363.5	29%	12.0%	6.9%
Analytical Technologies	\$1,052.0	22%	38.5%	5.2%
Specialty Diagnostics	\$866.4	18%	1.4%	2.4%
Laboratory Products & Services	\$1,699.0	36%	3.0%	4.2%

[Click to enlarge](#)

Analytical Technologies sales grew 5%, led by strong demand for both chromatography and MS products, especially from pharmaceutical and applied customers in Asia. The company highlighted demand for the high-end MS Orbitrap product lines, while chromatography sales growth was more uniform across major product lines.

Lab Products and Services sales grew 4%, including strong growth in both the channel and manufacturing lab products businesses. However, biopharma service revenues were negatively impacted by the discontinuation of a large clinical trials study. Sales in the Specialty Diagnostics segment improved 2%.

Geographically, Asia-Pacific sales advanced in the low double digits, including mid-teens sales growth in China, and continued strength in India and South Korea. Sales in North America and Europe advanced in the low single digits and mid-single digits, respectively. Sales to Rest of the World were flat.

Thermo's adjusted gross margin expanded 110 basis points to 49.3%. Adjusted operating margin progressed 90 basis points to 22.6% due to productivity improvements and increased sales volume. The company initiated several minor restructuring measures during the quarter, including facility consolidation and headcount reduction, to help augment acquisition synergies.

The company raised its 2017 revenue guidance by roughly \$110 million to \$19.51-\$19.71 billion for growth of 7%-8%, including 4.5% growth from acquisitions and currency headwinds of 1.5%. However, the elevated revenue guidance was attributed to new acquisitions and lower projected currency headwinds. The company's overall organic annual growth forecast of 4% was unchanged.

## Waters Boasts Strong Biopharma Demand

Waters delivered a stronger-than-expected first quarter, as sales advanced 4.8%, 5.9% organically, to \$498.0 million. Furthermore, sales were negatively impacted by two fewer selling days, which reduced overall sales growth by 1%, and sales for recurring revenues by 2%. Adjusted for normalized selling days, instrument and recurring revenues grew 6% and 7% organically to account for 47% and 53% of sales, respectively.

Biopharmaceutical demand was again highlighted, as sales for this market climbed 9% organically. Increased large molecule drug development in the Americas and Europe, as well as heightened QC testing in China and India boosted demand from this market. However, US biopharmaceutical sales declined slightly, primarily due to a strong year over year comparison for small molecule applications and slower budget spending early in the quarter.

Waters Q1 FY17				
	Rev. (\$M)	% of Rev.	Rev. Growth	Org. Growth (est.)
<b>Waters Div.</b>	<b>\$443.4</b>	<b>89%</b>	<b>4.5%</b>	<b>6%</b>
Instrument Systems	\$197.8	40%	4.9%	6%
Chemistry	\$87.9	18%	4.5%	6%
Service	\$157.7	32%	4.1%	6%
<b>TA</b>	<b>\$54.5</b>	<b>11%</b>	<b>6.8%</b>	<b>5%</b>
Instrument Systems	\$38.6	8%	9.7%	6%
Service	\$15.9	3%	0.4%	1%

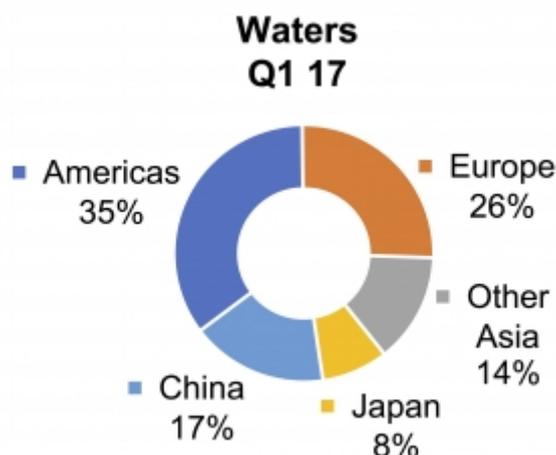
[Click to enlarge](#)

Industrial-related sales advanced 8% organically, driven by food and fine chemical applications, especially in Asia and Europe. The company also noted improved demand for materials characterization and industrial polymer applications.

Sales in the more volatile academic and government markets declined 11% organically, primarily due to weakness in Europe. However, academic and government sales improved in Asia, and were particularly strong in Latin America due to timing of orders.

Organic sales for the Waters product segment grew 6%, led by strong demand for the ACQUITY Arc and QDa, Alliance HPLC products and Xevo TQ systems. Segment growth was especially strong in China and India, for which sales grew in the 20% range each. However, this was partially offset by lower demand in the US and Japan, for which sales declined 8% and 5% including currency, respectively.

TA sales grew 5% organically, led by higher sales of the new Discovery systems and rheology products. TA sales grew in the strong double digits in Europe and roughly 10% in China, but declined in Japan.



[Click to enlarge](#)

All geographic figures below are based on currency-neutral sales and include modest contributions from acquisitions. Sales in Asia climbed 13%, including 24% sales growth in China and double-digit sales growth in India. However, Japanese sales fell 8% because of a strong comparison. Similarly, US sales, which declined 7%, were negatively impacted by particular strength for small molecule sales in the previous year. Sales in Latin America grew in the upper teens.

European sales advanced 9%, led by positive demand from biopharmaceutical customers, as well as industrial markets, especially for materials characterization and chemical analysis. This growth was partially offset by lower European academic and government funding.

Waters' gross margin was roughly flat at 57.6%. Adjusted operating margin expanded 60 basis points to 27.1% due

to increased sales volume and favorable currency impacts. The company projected a slightly more optimistic 2017 sales guidance, with currency-neutral sales expected to grow in the strong mid-single digits. Second quarter sales are expected to grow at a similar rate. Currency headwinds are projected to reduce full-year 2017 and second sales growth by 2% and 3%, respectively.

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## Thermo to Buy CDMO for \$7.2 Billion

*Waltham, MA and Durham, NC 5/15/17*—Thermo Fisher Scientific will commence a tender offer to acquire Contract Development and Manufacturing Organization (CDMO) Patheon for \$7.2 billion, or \$35 per share, including \$2.0 billion in debt. Patheon is a provider of drug development and delivery solutions to the pharmaceutical and biopharma industries. In 2016, it recorded revenues of \$1.9 billion. Thermo will fund the purchase through \$5.2 billion debt and \$2 billion in equity. “Patheon’s development and manufacturing capabilities are an excellent complement to our industry leading offering for the biopharma market,” stated Thermo Fisher and CEO Marc N. Casper. As benefits from the transactions, Thermo Fisher cited entry into the high-growth CDMO market; combined strength for pharmaceutical and biotech customers; synergies, including cross selling opportunities; and financial returns. Thermo Fisher estimates the deal will be accretive to its EPS by \$0.30 the first full year after close. Synergies are expected to total \$120 million by the third full year after close, and consist of \$90 million in cost synergies and \$30 million of adjusted operating income benefit from revenue-related synergies. Patheon will join Thermo Fisher’s Laboratory Products and Services segment. The deal is scheduled to close by year end.

*The price is a 34.6% premium to Patheon’s closing price on May 12. Patheon is expected to account for about 10% of Thermo Fisher’s annual revenues, according to a conference call discussing the deal. On the call, Mr. Casper stated that like Thermo Fisher’s bioproduction and biopharma services businesses, its fastest growing businesses in recent years, Patheon’s business is a provider of outsourced services to pharmaceutical and biopharmaceutical companies. Thermo Fisher’s bioproduction and biopharma services (clinical trial logistics and packaging) businesses represent \$2.25 billion in annual revenues, according to the call.*

*Patheon CEO James C. Mullen commented on the call, “Together, both companies will be better positioned to add scale and new value chain capabilities to our biopharma customers.” Mr. Casper also said each company will leverage their existing pharma and biopharma relationships for cross selling opportunities.*

*Thermo Fisher estimated the CDMO market at \$40 billion, with growth rates in the high to mid-single digits, consisting of three product segments: development services, API manufacturing and finished dosage form manufacturing. Patheon participates in all three markets. Patheon provides drug product services (61% of revenue), drug substance services (27%) and pharmaceutical development services (12%), with 26 manufacturing and development locations. It is focused on API manufacturing for biologics and complex chemistries.*

*Thermo Fisher estimated debt at 4x total debt to combined adjusted EBITDA at the deal’s completion and plans to lower this to 3x debt within 18 months after close.*

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## VWR to Be Acquired

*Center Valley, PA and Radnor, PA 5/5/17*—Investment firm New Mountain Capital has announced an acquisition offer for VWR, a provider of product and service solutions to lab and production customers, for approximately \$6.4 billion. New Mountain Capital will offer \$33.25 per share, a 17% premium to VWR’s May 2 stock price, the date prior to speculation about the potential sale. VWR will merge with Avantor, a New Mountain Capital company that supplies ultra-high-purity materials to life science and advanced technology customers. New Mountain Capital stated that the purchase will create a vertically integrated organization for serving customers, research through production. “We will bring together our well-known expertise in ultra-high-purity materials and customized solutions with VWR’s global scale, unparalleled channel access and deep customer relationships. Collectively, this will create a larger, stronger and more diversified company with significantly enhanced scale and product breadth,” stated Avantor CEO Michael Stubblefield. “The global customers that we plan to serve in a more high-touch manner will

immediately benefit from the combination, as we will provide end-to-end solutions that offer increased quality, effectiveness and productivity.” Mr. Stubblefield will lead the combined company. Pending shareholder and regulatory approval, the transaction is expected to close in the third quarter. Following the closing, VWR will no longer be publicly listed.

*Madison Dearborn Partners (MDP) and VWR management, representing 35% of issued and outstanding shares, have agreed to vote in favor of the purchase. The sale will end MDP’s control of the company, which began in 2007 (see [IBO 5/15/07](#)) and continued after VWR’s 2014 IPO (see [IBO 9/30/14](#)). The transaction agreement specifies a 35 day “go shop” period in which VWR can seek other potential offers.*

*VWR President and CEO Manuel Brocke-Benz cited “the changing dynamics in the highly fragmented and diverse life sciences sector” in the deal’s announcement. The newly combined company is expected to have annual revenues of more than \$5 billion, diversifying VWR’s portfolio beyond its primary business of lab product distribution. VWR’s primary competitor is Thermo Fisher Scientific, which continues to grow in size and expand its capabilities for the pharmaceutical market. Avantor’s laboratory chemical brands include J.T.Baker and Rankem, which are distributed by VWR, as well as chemical products for a variety of industries, including pharmaceutical manufacturing.*

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## MilliporeSigma Acquires “Virtual Synthesis” Firm

*Billerica, MA 5/9/17—Millipore Sigma has acquired Grzybowski Scientific Inventions (GSI) for an undisclosed amount. GSI developed the Chematica computer-aided, retro-synthesis software for identifying synthesis pathways. The system provides optimized routes for chemical targets using advanced reaction rules and proprietary algorithms. “With a 350 year legacy in the pharmaceutical and chemistry business, we recognize the attractiveness of the chemical synthesis and cheminformatics market and how it complements our existing leadership position in chemicals and reagents,” said MilliporeSigma CEO Udit Batra.*

*MilliporeSigma stated that the purchase complements its e-commerce platform and portfolio of products for chemical synthesis. The deal is notable for the investment in software tools, as Thermo Fisher Scientific and Sartorius have also purchased software companies this year, indicative of the expanding role of informatics in labs.*

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## Bruker Buys Light-Sheet Microscopy Firm

*Billerica, MA 5/8/17—Bruker, a provider of scientific instruments and high-value analytical and diagnostic solutions, has acquired Luxendo for an undisclosed amount. A spin-off of the European Molecular Biology Laboratory, Luxendo supplies Single Plane Illumination Microscopy (SPIM) systems. SPIM reduces sampling times compared to conventional laser scanning confocal microscopy, limits the damaging effects on living specimens, and provides fast scan speeds for volumetric imaging of small organisms, cell monolayers and cleared tissue. “With its strong IP position and unique SPIM technology, Luxendo has quickly established itself in the light-sheet microscopy market, particularly in Europe,” commented Bruker NANO President Dr. Mark R. Munch. “Similar to our recent acquisition in super-resolution microscopy, the new capabilities provide valuable application synergies to our current suite of instruments, and we feel that we can take the business to the next level in both global market reach and next generation development, which should greatly benefit our life sciences research customers.”*

*Other competitors in the light-sheet microscopy market include ZEISS and Leica Microsystems (see [Market Profile](#)). With this purchase, Bruker buys a young company that it can grow through distribution and product development. Luxendo began sales of its product line last year.*

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## SYGNIS Makes Third Acquisition in a Year

Madrid, Spain and Heidelberg, Germany 5/8/17—SYGNIS, a supplier of technologies for molecular biology, has agreed to acquire Innova Biosciences for €8 million (\$9 million = €0.88 = \$1) in cash, 2 million in shares, and up to 1.5 million additional shares depending on milestones. Innova Biosciences develops, manufactures and commercializes labeling reagents, including the Lightning-Link product line. The companies expect to generate combined 2017 revenues of more than €10 million (\$11 million = €0.90 = \$1). “Innova is a profitable company with one third of its revenues coming from the US and UK markets, respectively. Innova’s strong marketing capabilities and top-notch management complement SYGNIS’ existing capabilities and will help us to deliver on our international commercialization strategy, driving revenues and enhancing profitability,” commented Pilar de la Huerta, co-CEO and chief business development officer of SYGNIS. In connection with the transaction, SYGNIS plans to issue new shares and initiate a private placement. (For SYGNIS 2016 financial results, see [Bottom Line](#).)

*Publicly held SYGNIS’ original product line was focused on kits for DNA/RNA sample enrichment and analysis. The company has expanded into proteomics with the purchases of Expedition (see [IBO 5/15/16](#)) and C.B.S. Scientific (see [IBO 12/15/16](#)), both proteomics providers. Each acquisition has been of a profitable company with additional direct sales capability. SYGNIS expects to break even this year. Each acquisition has added new technologies to the company’s life science consumables portfolio. Innova Biosciences’ Lightning-Link technology directly labels antibodies and proteins. Advantages include 30 minutes hands-on time, no spin or separation steps, and full scalability.*

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## Light-Sheet Microscopy

Optical microscopy remains a very active area of technological innovation, and one of the most exciting techniques to achieve commercialization in the past decade is light-sheet microscopy. Other common names for the technique include Light-Sheet Fluorescence Microscopy (LSFM) and Selective Plane Illumination Microscopy (SPIM). The technique offers a number of significant advantages for imaging live cells and even entire intact organisms, and this has stimulated great interest in developmental biology and other life science fields of research.

As the names suggest, the key to the technology is the illumination, which is confined to a relatively thin plane or sheet that intersects the sample. This is achieved with the use of a cylindrical lens and other optical components to confine the illumination from the source into a thin plane. Alternatively, a “plane” can be built up over time by scanning a linear beam across the sample. Typically, there will be a locus where the sheet is thinnest, and placing the sample there provides the best imaging. Light-sheet microscopy is a fluorescence technique, so the illumination excites fluorescent molecules and the resulting fluorescence is detected with a scientific camera.

Another distinguishing feature of the technique is that this planar illumination is perpendicular to the detection optics. Thus, the detection optics receive the fluorescent signal from the entire thin slice of the sample. As the sample is moved vertically through the light sheet, an entire 3D reconstruction of the sample can be achieved. Because the illumination is limited to a specific plane, phototoxic effects on living samples is reduced.

At the same time, there are some challenges. Because the light has to pass perpendicularly through the sample, large samples may not be suitable, as the light source is absorbed or scattered. Even small features that block a portion of the light can lead to “stripes” in the images. Combining multiple views of the sample can eliminate these artifacts, and the use of multiphoton techniques allow the use of longer wavelengths that can penetrate farther into larger samples. This barely scratches the surface of the many different wrinkles on the technique that exist.

Applications are primarily life science oriented and come largely from academia. Samples range from single cells to cleared tissue samples to complete small live organisms. The ability to image the same embryo at different stages of its development has enabled advances in developmental biology.

Since the technology was originally developed in various academic research groups, many systems continue to be home-built. OpenSPIM, an open-source group, provides researchers with a parts lists and instructions, so that with an outlay of effort and perhaps \$40,000 in parts, a skilled microscopist can build a functional system. However, commercial systems have also begun to proliferate. LaVision Biotec is generally credited as having the first system in 2009, and the company continues to be a leading vendor, now with the second generation of its UltraMicroscope. ZEISS also entered the market quite early with the Lightsheet Z.1. Leica Microsystems has adapted one of its confocal microscopes with a clever system of mirrors to add light-sheet imaging capability. Other market

participants are generally smaller firms focusing directly on the development and elaboration of the technique. These include Intelligent Imaging Innovations (3i), PhaseView and Applied Scientific Instrumentation, which partners with Nikon. Another vendor, Luxendo, was recently acquired by Bruker (see [Executive Briefing](#)). Vendors of scientific cameras and microscopy components, such as Andor Technology (Oxford Instruments) and Hamamatsu, also contribute to the market.

## Light Sheet Microscopy At a Glance:

### Leading Suppliers:

- ZEISS
- LaVision Biotec
- Leica Microsystems (Danaher)

### Largest Markets:

- Academia
- Government
- Biotechnology

### Instrument Cost:

\$40,000-\$300,000

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## Chemicals

According to *Chemical & Engineering News (C&EN)*, sales for almost all of the top 50 US chemical firms declined in 2016 due to low prices of raw materials. Dow Chemical topped the list of 50 companies, followed by ExxonMobil, DuPont, PPG Industries and Praxair rounding out the top 5. Revenues for all 5 companies declined, except PPG Industries.

Collectively, the 50 chemical companies brought in a total combined revenue of \$259.9 billion in 2016, a 5.6% drop. The decline was not due to low sales at a handful of companies, which then affected the group as a whole; rather, the fall in sales revenue was apparent at virtually all companies. Only 9 out of the 50 firms had increases in revenues, which were mostly due to large acquisitions. M&A has been responsible for major changes in the chemical industry, namely Dow Corning's merger with Dow; Merck KGaA's purchase of Sigma-Aldrich; Solvay's purchase of Cytec Industries; Axiall's acquisition by Westlake Chemical; and Arizona Chemical's acquisition by Kraton.

Low oil prices are partly to blame for the revenue decline across the top chemical companies, as prices fell to \$30 per barrel in early 2016, a 14-year low. Though oil prices bounced back by the end of 2016, the effects were still impacting the chemical industry. The revenue decline is also attributable to lackluster US trade, as US GDP grew by only 1.6% in 2016, as did the US chemical industry's increase in volume.

Profits for the top 50 chemical firms also fell in 2016, with 44 companies reporting combined profits of \$33.6 billion last year, a 9.6% decline. However, 2017 is looking brighter for the chemical industry. Market capitalization for the 31 publicly traded companies in the top 50 list grew to \$347.6 billion in 2016, a 12% increase, and the American Chemistry Council predicts a 3.6% growth in volume for 2017.

Source: [C&EN](#)

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## Government

In early May, the NIH announced unprecedented changes to its research funding scheme, stating that individual

scientists will be restricted in the amount of funding they receive, which will be based on a point system. The agency indicated that only 10% of scientists win 40% of NIH research funding. Due to encouragement from advocacy and advisory groups over the past 10 years to address the inequality in funding allocations, the agency has decided to make this change. The change was made in the hopes of leveling out the research playing field by allowing early- and mid-career scientists more opportunities to receive funding compared to more experienced, well-known scientists. Based on NIH research, the productivity of scientists rises based on the amount of NIH grants they are awarded, but it begins to decline once they receive over \$700,000 per year in NIH grants.

While there is no change to the number of grants or the amount of funding a scientist can obtain, the NIH will instead roll out a new metric system called the Grant Support Index (GSI) which allots a point value to each grant based on the how large and complicated the research project will be. At most, scientists can qualify for three R01 grants (the most popular NIH grant scientists receive), which is the equivalent to 21 GSI points. Scientists with over 21 GSI points that desire another grant will be required to present a case to the NIH as to how their existing grants can be rearranged to cover their new projects as well. An expected 1,600 new grants are anticipated to be made available with this change. The point system will be implemented by the NIH within the next few months.

**Source:** [Nature](#)

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## Genetic Engineering

According to the National Academy of Sciences, there will be a dramatic increase in the research, complexity and development of biotechnology products enabled by CRISPR-Cas9. Common application areas for gene editing technologies, including CRISPR-Cas9, include agriculture, dairy, food, biomedical and clinical research, and human health and medicine. The technology also provides ample project opportunities in basic research.

The Coordinated Framework for the Regulation of Biotechnology is the main federal guidance that regulates biotech products. The guidance states that “genetically engineered products should continue to be regulated according to their characteristics and unique features, not their production method.” The Framework consists of the EPA, USDA and the FDA, with the respective agencies regulating the effects of genetically engineered products on the environment, agriculture and humans.

Federal funding for CRISPR-related research has radically increased, with NIH funding for the field jumping from \$5.1 million in FY11 to \$603 million in FY16. CRISPR-related research papers also greatly increased, rising from 86 in 2011 to 2,162 in 2016. Much of the increases in federal funding is due to the Human Genome Project program.

Although CRISPR-Cas9 technology is still in its early stages, it has received a great deal of interest and investments from financial and industrial sectors. Recent notable investments at CRISPR-related gene editing companies include \$94.4 million raised by Editas Medicine in its February 2016 IPO. In March, the company inked a \$90 million upfront deal with Allergan for the pharmaceutical company to license a maximum of five preclinical programs for eye disease. CRISPR Therapeutics AG has raised almost \$140 million, raising \$94 million in 2016 alone. The company also partnered with Bayer to establish the joint research venture Casebia Therapeutics, which is dedicated to commercializing therapeutics to cure blood disorders, blindness and congenital heart disease. Intellia Therapeutics had raised \$538 million as of last month.

**Source:** [Congressional Research Service](#)

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## Germany

The German biotechnology sector has been growing robustly since 2010, with R&D expenditure in the field reaching an all-time high in 2016. For the third year, biotechnology R&D spending was over €3 billion (\$3.2 billion), with spending in 2016 increasing by 8% to €3.54 billion. R&D expenditure in medical biotechnology increased 6.6%, or €991 million, to in 2016. Diagnostic biotechnology has shown stable growth, with the field's turnover increasing 9.3% to €1.79 billion in 2016, and R&D expenditure increasing 15.9% to €280 million.

Financial investments in biotechnology R&D have remained stable, although they decreased 8.2% in 2016 to €505 million. Of that figure, 42%, or €216 million, went into the private biotechnology sector, a 17% decrease, while the remainder was invested in public companies. Foreign investors took part in financing 8 of the 21, or 32%, of private financing rounds. The number of startup biotechnology companies doubled to 20 in 2016, with 14 startups in the health biotechnology sector, 4 in nonspecific services and 2 in bioinformatics.

Fifty-seven German companies have one or more products in clinical development, with 101 biologically active compounds involved in 1 of the 3 developmental phases last year. The healthy drug development pipeline is attributable to high interest in immuno-oncology and cell therapies. Biotechnology employees were also at a record high in 2016, with 20,280 people working in biotechnology companies.

**Source:** [BIOCOM AG](#)

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## UK

With Brexit proceedings formally in process, the European Medicines Agency (EMA) is preparing to move out of its London, England, headquarters by 2019, which is when the UK will officially leave the EU. The Agency employs nearly 900 people and is the EU's chief authority for the approval and safety monitoring of all drugs across continent, making it the largest EU government body in the UK. EMA has a yearly budget of €322 million (\$347.2 million); consequently, it would be a valuable asset for other countries. Countries that have already made offers to host the EMA include Italy, Denmark, Sweden, Spain, France, Ireland and Poland. However, due to the bureaucracy and politics involved in the Brexit proceedings, the EMA is at risk of being interrupted in its regulatory activities.

The precarious situation has already caused several key staff to leave the EMA and made it more difficult to attract recruits. Moreover, the number of applicants for the Agency's trainee program has fallen approximately 65%, from an average of 2,000 to 700. The UK is projected to be hit the hardest with the relocating of the EMA, as 80% of the Agency's workload is contributed by other European countries. The possibility of some kind of convergence deal is being pushed by drug manufacturers and UK officials to collaborate on a new regulatory approval process, which can help make the relocation process less challenging. The decision on where to relocate will be made by EU heads

of state through the European Council.

Source: [Reuters](#)

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## India

Based on a scientometric analysis conducted by researchers at the Indian Institute of Science in Bengaluru, India's research output in chemistry is lagging in comparison to its global peers, especially China. Using the aggregator Scopus' database, researchers looked at the 25-year period of 1991-2015, finding that although the number of India's chemistry research papers steadily increased during that time, especially from 2007-2014, overall the nation's output was much below the world average. Within this period, output increased at a CAGR of 8.9%, and citations of at least one Indian author in leading chemical journals was above the world average.

Despite this, overall Indian representation in global chemistry research has been low. For example, India's share of papers in the *Journal of the American Chemical Society* was close to 1%, a stark contrast from the US, Germany and China, which had shares of 58%, 8% and 5%, respectively. Similarly, in Germany's international *Angewandte Chemie* journal, India had a share of 1% of research papers, while the US, Germany and China had shares of 25%, 28% and 10%, respectively.

In the top percentile of the most commonly cited chemistry papers, India represented a minimal share of output at 2%, whereas China is the world leader with 38%. China is one of the top four countries that have the largest number of highly cited papers in 11 out of 27 fields, but India's output is mostly limited to chemical engineering.

The analysis indicates that although India is making progress in increasing its research output, it has been slow. To combat this, the analysis recommends spending more on R&D and creating more inter- and multidisciplinary approaches to science. For example, Indian academic institutes still separate physical, organic and inorganic chemistry as standalone subjects—combining these fields could promote better research and collaboration. The analysis also suggests that the government continues the increase in fellowships and grants to reverse the “brain drain” in the country.

Source: [Current Science](#)

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## Life Science Consumables

### Company Announcements

Taiwanese company **Crown Bioscience**, whose CrownBio Life Science division sells reagents, completed an IPO by auction on the **Taiwan Stock Exchange** in November 2016.

In May, **Meridian Bioscience** announced that CEO John A. Kraeutler plans to retire once a successor is found. He will remain chairman.

### Consumables for Gene-based Analysis

#### Company Announcements

**Transgenomic** delisted from the **NASDAQ** in February. The company's merger agreement (see [IBO 10/15/16](#)) is expected to close in the second quarter.

In March, pathogen-detection system developer **LexaGene**, which is listed on the **Toronto Stock Exchange-Venture Exchange**, began trading on the US's **OTCQB Venture Market**.

**ThermaGenix**, a provider of PCR reagents and assays, exclusively licensed certain technologies from **Brandeis University** that enhance detection and analysis of DNA and RNA. Starting in May, ThermaGenix will sell the Therma-Stop and Therma-Go products for enhanced sensitivity and accuracy of conventional PCR reactions.

**ThermaGenix** completed a \$1.5 million Series A-1 financing round in April. The funding will be used to develop its PCR additive reagents, which eliminate all forms of mis-priming during and after PCR and RT-PCR.

In April, **Lucigen** entered into an agreement to be the exclusive distributor of **Illumina**'s Epicentre products.

In April, reagent manufacturer **BioGx** established a European operation based in Amsterdam, the Netherlands.

**Becton, Dickinson** licensed its stochastic labelling technology, utilizing molecular indexes, to **Roche** in April for multiple commercial applications.

**ChromaCode** announced in April that it raised \$12 million in Series B funding, led by **New Enterprise Associates**. The funding will be used to develop its High-Definition PCR technology, which uses digital signal processing to improve molecular analysis.

**Integrated DNA Technologies** named **LubioScience** as a distributor for Switzerland.

In May, **Oxford Genetics** licensed access to **ERS Genomics**' foundational intellectual property related to CRISPR/Cas9 gene editing technology for use in providing services, R&D, development of research tools and reagents, and for use of CRISPR-edited cell lines for GMP manufacturing of bio-therapeutics.

## Product Introductions

**Agdia** introduced the AmplifyRP XRT+ kit for detection of *Xylella fastidiosa*, a causal agent of multiple crop diseases. The test is a real-time isothermal DNA amplification assay utilizing recombinase polymerase amplification technology.

**Asuragen** released in March the AmpliDeX PCR/CE *TOMM40* Kit to advance studies of neurodegeneration, dementia progression and Alzheimer's disease.

In March, **Cellecta** launched the Driver-Map Human Genome-Wide Gene Expression Profiling RT-PCR kit, a targeted RNA expression profiling assay designed to provide a molecular snapshot of all known 19,000 human protein-coding genes from complex samples starting with as little as 10 pg of total RNA.

In April, **transOMIC** introduced the transEDIT-*dual* CRISPR combinatorial gene knockout kits, targeting over 19,000 genes in the human genome. The vector system is engineered to express two different gRNAs targeting the same gene from one lentiviral vector.

## Sales/Orders of Note

In April, **Twist Bioscience** announced that **Microsoft** will purchase 10 million strands of DNA for expanded digital data-storage research. The strands will be long-chain oligonucleotides used by researchers at Microsoft and the **University of Washington** to encode digital data at higher density. The companies initially announced an agreement in April 2016.

## Consumables for Cell-based Analysis and Cell Culture

### Company Announcements

**Oxford Genetics** signed in March a distribution agreement with **CLS Cell Lines Service**, giving its customers access to over 400 mammalian cell lines.

In April, **Emulate** announced a Cooperative Research and Development Agreement with the **FDA Office of Foods and Veterinary Medicine** to evaluate Emulate's Organs-on-Chips technology as a platform for toxicology testing to meet regulatory evaluation criteria for products.

**Organovo** named Taylor J. Crouch as CEO in April. Mr. Crouch was previously CEO of **eStudySite**. Former CEO Keith Murphy remains chairman.

In May, **Organovo** announced a collaboration with the **University of Virginia** to develop 3D bioprinted tissues for volumetric muscle loss injury.

In April, **Cellular Dynamics** (CDI) entered into a distribution agreement with **STEMCELL Technologies**, which will distribute CDI's iCell catalog in North America, Europe and Singapore, with other countries under consideration.

**Cellular Dynamics** announced in April a collaboration agreement with the **Harvard Stem Cell Institute** (HSCI) designed to increase the availability of iPS cells and services to the HSCI network and research community at large.

In May, **InSphero** entered into a collaboration with the **NIH's National Center for Advanced Translational Sciences** to identify anti-cancer agents with cytotoxic activity in 3D tumor models.

In May, **PELOBiotech** agreed to exclusively distribute **ReachBio's** product lines to the life science research market in Europe. ReachBio's main product lines are cryopreserved normal human primary cells derived from peripheral blood, cord blood and bone marrow, as well as ColonyGEL methylcellulose-based media for hematopoietic colony forming cell assays.

## Product Introductions

**STEMCELL Technologies** in March introduced the CloneR, a novel medium formulation to aid researchers in their ability to successfully genome edit human PSCs.

In March, **Lonza** released a portfolio of fresh and cryopreserved human and animal hepatocytes for ADME-Tox testing, available via its acquisition of **Triangle Research Laboratories** (see [IBO 7/15/16](#)).

**ATUM** (formerly **DNA2.0**) launched in April cell-line development services, using its Leap-In Transposase genome engineering tools.

In April, **Miltenyi Biotech** released the MACS GMP T Cell TransAct, a ready-to-use reagent for efficient in vitro activation and expansion of human T cells. It is also available in research grade.

**Corning Life Sciences** introduced in April the Corning TransportoCell HEK293-derived ABC transporter membrane vesicles and Corning Supersomes Ultra Human Aldehyde Oxidase enzyme.

## Consumables for Protein-based Analysis

### Company Announcements

In April, **BIOKÉ**, a business unit of **Cell Signaling Technology Europe**, agreed to exclusively distribute **Bethyl Laboratories'** antibody products in the BeNeLux countries. Bethyl Laboratories's portfolio consists of over 7,500 catalog products.

**SomaLogic** named Alister W. (Al) Reynolds as CEO, replacing Byron Hewett. Mr. Reynolds has served on SomaLogic's Board since 2003. He previously served in a variety of senior executive positions at **Quest Diagnostics**.

In April, **SYGNIS** announced the completion of a second OEM contract with Chinese proteomics firm **TANON**, granting rights to sell three additional product lines, including InstantBlue and ultrafast blotting buffers. Related annual revenues are expected to exceed €1 million (\$1 million).

## Product Introductions

**Olink Proteomics** introduced in February the Cardiometabolic, Cell Regulation, and Development biomarker panels. Each panel offers simultaneous analysis of 92 protein biomarkers using 1 µL of sample.

In April, **Neogen** released the Reveal for Pork lateral flow test for detecting raw pork in meat and environmental samples. It can detect as little as 0.5% raw pork in meat samples.

**Romer Labs** introduced in April the AgraQuant Aflatoxin M<sub>1</sub> High-Sensitivity ELISA kit, featuring a unified pipetting volume of 100 µL and no required agitation step.

In April, **Waters'** VICAM business launched the Ochra-V AQUA lateral flow strip test for the detection of ochratoxin A in green coffee and wheat. Compared to traditional methods, it reduces testing time by half.

**Bio-Rad Laboratories** launched in April the StarBright Blue 700 fluorescent dye-labeled secondary antibodies for use in western blotting with a two- to fourfold lower limit of detection than IR800-labeled antibodies. The company also released the hFAB Rhodamine Anti-Housekeeping Protein Primary Antibodies for one-step detection of housekeeping proteins using western blots.

In May, **Bio-Rad Laboratories** introduced the Bio-Plex Pro Human Apolipoprotein Panel, a 10-plex panel for detecting and quantifying key human apolipoproteins associated with cardiovascular disease.

In April, **Tocris Bioscience**, a **Bio-Techne** company, launched Janelia Fluor dyes for advanced imaging techniques. The technology was licensed from **Howard Hughes Medical Institute**. The range comprises Janelia Fluor dyes JF646 and JF549 and photoactivatable derivatives of these reagents.

In April, **Genovis** launched GlyCLICK, which combines its GlycINATOR enzyme with **Life Technologies'** SiteClick technology. GlyCLICK is a platform for labeling antibodies at the same site each time.

**Genovis** introduced in May the FabALACTICA enzyme for antibody analysis, with specific activity affecting human 1gG1 antibodies. It does not require additives.

**Aushon BioSystems** introduced in May the Ciraplex ULTRA Ultrasensitive Human 3-Plex IL-1 $\beta$ , IL-6, IL-10 Multiplexed Assay, a plate-based protein assay to obtain low levels of detection for up to 3 biomarkers in 1 assay. Measurement is at single-digit fg/mL levels.

In May, **Innova Biosciences** introduced the FlexLISA kit for the development and optimization of sandwich ELISA assays. Researchers can covalently conjugate up to 3 capture and 3 detection antibodies.

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## GC & GC/MS

### Company Announcements

**INFICON's** fourth quarter 2016 sales for Security & Energy rose 13.3% to \$9.5 million, or 11% of sales, as shipping issues were resolved. For 2016, division sales rose 49.8% to \$33.1 million, or 11% of sales. First quarter sales for INFICON Security & Energy declined 17.2% to \$5.3 million.

In March, **VUV Analytix** announced the approval of its first **ASTM International** method, D8071 for the analysis of finished gasoline: "Standard Test Method for the Determination of Hydrocarbon Group Types and Select Hydrocarbon and Oxygenate Compounds in Automotive Spark-Ignition Engine Fuel using Gas Chromatography with Vacuum Ultraviolet Absorption Spectroscopy Detection (GC-VUV)."

**Techcomp**, owner of **SCION Instruments**, announced in March the transfer of SCION R&D from San Francisco, California, to Livingston, UK, where a Techcomp Research and Engineering Centre is being created.

In March **SCION Instruments** announced improved service contract structures and pricing for North America, under which labs with GC and GC/MS instruments from **Bruker**, **Varian** and SCION can all be serviced directly by SCION.

**Alpha MOS's** 2016 sales declined 8.5% to €7.5 million (\$8.3 million). In Europe, sales growth was impacted by the discontinuation of certain product lines. In early 2017, the company sold its Japanese subsidiary to management for €0.6 million (\$0.7 million).

## Product Introductions

**SCION Instruments** released in March its CompassCDS 4.0. New features include HPLC instrument support for **Agilent Technologies'** 1100 and 1200 Series, and multilanguage support, with Chinese being the first supported language.

For its GC systems, **SCION Instruments** in March launched the SCION SPT (Sample Pre-concentration Trap) for low-level determinations, and a system for gas analysis for fast analysis with a large dynamic range.

In March, **Phenomenex** released three Zebron GC columns, specially developed for Fatty Acid Methyl Esters (FAME) in food: the ZB-FAME with selectivity targeting a 37-compound mix in a shorter column for faster run time; the Zebron ZB-88, an alternative to other 88-phase columns for the separation of cis/trans isomers; and the Zebron ZB-23, a cost effective alternative to existing 23-phase columns for the separation of cis/trans isomers in a group of products that includes omega-3 and fish oils.

For its MPSrobotic MultiPurpose Sampler, **GERSTEL** launched three new products in March: the <sup>m</sup>VAP six-position evaporation station, which concentrates samples at user-defined temperature and vacuum; the Filtration/DNPH Elution option, enabling automated clean-up of up to 98 samples or extracts using standard filter, or up to 20 DNPH cartridges; and the QuickMix for fast and efficient mixing and extraction of samples as part of the automated sample preparation process.

In May, **Shimadzu** launched the Nexis GC-2030, featuring improved ease of connectivity and ease of use with a full-color LCD touch panel. It allows up to three analytical lines, and a choice of four inlets and six detectors. It also features tool-free column installation.

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# Process & Bioprocess Analysis

## Process Analysis

### Product Introductions

**Metrohm Process Analysis** released in February the 2035 Process Analyzer, an integrated solution for 24/7 online monitoring of chemical parameters such as ortho- and total phosphate phosphorus in wastewater streams. It utilizes a compact digestion cuvette photometer module.

In March, **Emerson Automation Solutions** and **TopNIR** introduced what they called the first complete blending solution that includes online crude characterization. It provides hydrocarbon property data in real time to help identify the potential value content in each crude stream.

In March, **Gasera** introduced the Gasera One Formaldehyde system, a portable system for affordable and easy and continuous background monitoring. It can achieve detection below 1 ppb.

**Mettler-Toledo Process Analytix** introduced in April a new version of its multiparameter M400 transmitter series, featuring a combined touchscreen and tactile soft-key user interface.

In April, **Hidden Analytical** introduced the Hidden ExQ quantitative gas analyzer, a multifeatured and compact MS system providing continuous online analysis of dynamic gas streams at pressures from sub-atmospheric up to 30 bar.

It is now configurable for either benchtop and rack mounting operation.

**IONICON** released in April the PTR-TOF 6000 X2 trace gas analyzer, based on the new ionTOF platform and featuring X2 tools, such as the ION-BOOSTER funnel and hexapole ION-GUIDE.

In May, **ABB Measurement & Analytics** introduced the PGC5009 “Fast” process GC for simulated distillation analysis.

**TOMRA** released in May the TOMRA FatScan for the continuous analysis of the composition and standardization of meat products, enabling chemical lean content measurements. It utilizes interactance spectroscopy. It was developed for small- and medium-sized meat processors.

In May, **AMETEK Process Instruments** introduced the Dycor FlarePro quadrupole process MS for flare-gas combustion monitoring. It provides BTU content measurement, even when confronted with widely changing flare gas streams. It is able to monitor and quantify 16 components in flare gas streams.

## Bioprocess Analysis

### Company Announcements

Synthetic biology firm **Synpromics** announced in January a research collaboration with **GE Healthcare** to jointly develop customized synthetic promoters optimized for GE’s biopharmaceutical manufacturing platform specifically, for extensive screening in GE’s CHO-based expression system.

**GE Healthcare Life Sciences** announced in February a three-year cell line engineering research collaboration with the **Austrian Centre of Industrial Biotechnology** to bring increased productivity to biomanufacturers. The goal is to modify and optimize CHO cell line performance using new analytical tools.

In April, **GE Healthcare Life Sciences China** and **Cellular Biomedicine** established a strategic research collaboration to codevelop certain high-quality industrial control processes in CAR-T and stem cell manufacturing. A joint lab will be established.

**GE Healthcare Life Sciences** completed a strategic minority investment in **Zenith Technologies**, a global enterprise integration company, in April. Methodologies, systems and libraries will be offered as a service to GE Healthcare clients in bioprocessing. The two companies will integrate process control systems, manufacturing execution system solutions and other supporting technologies. Zenith Technologies has 700 employees.

In February, biotech services company **Stratophase** entered into a joint collaboration agreement with **Merck KGaA** to apply its Ranger technology to Merck’s cell culture manufacturing platforms. The companies will also develop dynamic control strategies that enable complex feeding regimes to be optimized and controlled in real time. Ranger technology is based on the real-time, online assessment of the metabolic activity of the cell culture.

In April, **MilliporeSigma** announced its sponsorship of the Startup Program at **LabCentral**, a nonprofit biotech incubator in Cambridge, Massachusetts. MilliporeSigma will give biotech startups access to process development tools, educational programs and training.

**MilliporeSigma** opened in May a new joint Process Scale-Up Lab in Bengaluru, India, to provide end-to-end solutions from process development to scale-up manufacturing for pre-clinical, clinical and commercial supply.

In May, **MilliporeSigma** expanded its M Lab Collaboration Center in Bengaluru, India, for biopharmaceutical manufacturers.

In April, Thermo Fisher Scientific entered into a strategic cooperation agreement with China-based Mab-Venture Biopharma to establish an antibody drug manufacturing facility utilizing Thermo Fishers’ SmartFactory automated control solution, according to [BioSpace](#).

## Product Introductions

In March, **MilliporeSigma** launched the Mobius MyWay portfolio, which features off-the-shelf and configured-to-order assemblies, as well as fully customizable configurations. Assemblies consist of three categories: Mobius Stock for on-demand solutions, which ship in 24 hours; Mobius Select consisting of custom assemblies, which ship in six weeks; and Mobius Choice, a highly customized solution.

**Sartorius Stedim Biotech** introduced in April the next generation BIOSTAT STR, a fully scalable, single-use bioreactor family based on a conventional stirred-tank design. It features upgraded hardware and software, as well as a fully integrated, new design of Flexsafe STR single-use bags. The series consists of five systems with working volumes of 12.5-2,000 L.

## Sales/Orders of Note

In April, **MilliporeSigma** announced that **BioInvent International** updated its manufacturing capabilities with a full line of its Mobius single-use bioreactors, adding 2 L, 50 L, 200 L and 1,000 L bioreactors to its upstream facility in Lund, Sweden.

**MilliporeSigma** announced in May that **Avid Bioservices** will update its Myford clinical and commercial manufacturing facility in California with multiple Mobius 2,000 L single-use bioreactors.

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# Laboratory Products

## Company Announcements

In March, **Stirling Ultracold** announced a new distribution agreement with **VWR** for North America for commercial, academic and nonprofit research customers.

**VWR** agreed in March to distribute **Avantor's** beaker-to-bulk J.T.Baker and Macron Fine Chemicals lab and pharmaceutical products to all European countries except Poland.

In March, **LabNetwork**, a **WuXi AppTec** company, announced a collaboration with **Elsevier** under which LabNetwork's discovery and research compounds are now available to users of the Reaxys chemistry database.

**Panasonic Healthcare** will change its name to **PHC**, effective April 2018.

**Azbil Telstar** named COO Jochen Dick as CEO in April. Former CEO Ton Capella remains chairman.

In May, **Mirion Technologies** named **Gammadata** as a distributor for the legacy **Canberra** products for Sweden, Norway, Denmark and Iceland.

## Product Introductions

In March, **Honeywell** launched its first series of Hydranal double-certified reference materials for Karl Fischer titration.

**Thermo Fisher Scientific** released in March My Pipette Creator, calling it the first cloud-based application designed to enable efficient, centralized programming of connected pipettes, and secure storage and sharing of protocols. It is designed for use with the Bluetooth-enabled Thermo Scientific E1-ClipTip electronic pipettes.

In March, **Huber** introduced the KISS (Keeping Innovation Safe and Simple) circulators for routine lab applications, consisting of over 50 models for heating and cooling from -30 C° to 200 C°. A UBS interface is now standard.

**ERWEKA** launched in March the ERWEKA Flow-Through Cell Tester USP 4 DFZ II, which fits all offered cell bodies. It features a new cell design for increased leak tightness.

**Revolutionary Science** launched in March the Incufridge Chilling Incubator, equipped with Ethernet, USB and Wi-Fi connectivity.

**Tecan** introduced in March the Fluent ID\* scanner module, which allows 32 barcoded samples to be loaded and identified in 3 seconds. It supports all major 1D barcode formats.

**Cole-Parmer** introduced in March the Symmetry touch-screen balance, including the B Series toploading and analytical balances; the Advanced P Series with additional diagnostic GLP function; the UMA-T and MA-T ultra-micro and micro balances; and the MB-T Series moisture balances.

In April, **BÜCHI Labortechnik** launched the Lyovapor L-300 and L-200 lab freeze dryers for continuous sublimation. The L-300 is designed for quantities up to 6 kg (13 lb) and the L-200, with unlimited capacity. They feature Infinite-Control, which allows for user control of all relevant process parameters from anywhere.

In April, **Distek** released the Model 2500 Select Bathless Dissolution Tester, which features heater jackets that raise media temperature from ambient to 37 C° in less than 15 minutes.

**Asynt** launched in May the DrySyn Octo 8-position parallel synthesizer, an entry-level product for chemists who want to conduct synthetic reactions under an inert atmosphere with temperature control, reflux and magnetic stirring.

In May, **Brooks Life Science Systems** introduced the BioStore IIIv, calling it the world's only -80 C° LN2 automated storage system for biological samples. It has the capacity to hold more than 120,000 1.0 mL FluidX Cryotubes or 63,000 2.0 mL FluidX Cryotubes, or other similar-sized labware.

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## Reported Financial Results



\$US	Period	Ended	Sales	Chg.	Op. Prof.	Chg.	Net Prof.	Chg.
AMETEK (Electronic Instruments)	Q1	31-Mar	\$619.8	8.9%	\$156.7	10.5%	NA	NA
Becton, Dickinson	Q2	31-Mar	\$2,969.0	-3.2%	\$446.0	-4.3%	\$344.0	1.8%
Becton, Dickinson (Life Sciences)	Q2	31-Mar	\$982.0	4.9%	\$177.0	-12.4%	NA	NA
Bio-Rad Laboratories	Q1	31-Mar	\$500.1	6.1%	\$25.6	-0.7%	\$12.4	1.1%
Bio-Rad Laboratories (Life Science)	Q1	31-Mar	\$174.3	5.1%	(\$18.8)	-469.7%	NA	NA
Bio-Techne	Q3	31-Mar	\$144.0	10.0%	\$32.3	-25.8%	\$21.4	-29.4%
Bio-Techne (Biotechnology)	Q3	31-Mar	\$94.5	16.1%	\$45.2	0.2%	NA	NA
Bio-Techne (Protein Platforms)	Q3	31-Mar	\$23.6	NA	\$3.3	NA	NA	NA
Brooks Automation (Life Science Systems)	Q2	31-Mar	\$34.7	31.0%	\$1.3	NM	NA	NA
Bruker	Q1	31-Mar	\$384.9	2.5%	\$37.6	10.6%	\$21.6	-8.5%
Bruker (Scientific Instruments)	Q1	31-Mar	\$346.4	-1.1%	\$38.1	15.5%	NA	NA
Datacolor	H1	31-Mar	\$34.9	3.5%	\$3.4	29.3%	\$3.4	29.0%
Fluidigm	Q1	31-Mar	\$25.5	-12.0%	(\$17.5)	7.1%	(\$17.2)	13.5%
Luminex	Q1	31-Mar	\$77.8	23.5%	\$14.0	18.7%	\$9.2	5.3%
Meridian Bioscience (Life Science)	Q2	31-Mar	\$16.4	17.6%	\$4.6	10.0%	NA	NA
Mettler-Toledo	Q1	31-Mar	\$594.6	10.2%	\$115.9	25.0%	\$92.5	40.8%
MKS Instruments	Q1	31-Mar	\$437.2	138.0%	\$83.6	270.5%	\$65.1	270.4%
MOCON	Q1	31-Mar	\$15.5	5.2%	\$0.8	7.2%	(\$0.0)	NM
MTS Systems (Test)	Q2	1-Apr	\$123.8	8.8%	\$6.4	271.3%	NA	NA
NanoString Technologies	Q1	31-Mar	\$18.1	22.9%	(\$17.5)	-31.5%	(\$18.9)	-29.1%
PerkinElmer	Q1	31-Mar	\$514.1	3.2%	\$51.6	-14.9%	\$38.6	-18.7%
PerkinElmer (Discovery & Analytical Solutions)	Q1	31-Mar	\$361.8	1.5%	\$30.6	-22.5%	NA	NA
PerkinElmer (Diagnostics)	Q1	31-Mar	\$152.4	7.6%	\$33.4	-1.1%	NA	NA
QIAGEN	Q1	31-Mar	\$307.7	3.1%	\$23.8	43.8%	\$17.7	12.3%
Repligen	Q1	31-Mar	\$30.6	21.9%	\$5.7	63.9%	\$3.1	\$0.9
VWR	Q1	31-Mar	\$1,139.1	3.7%	\$81.5	2.3%	\$38.5	-0.8%
VWR (Americas)	Q1	31-Mar	\$692.8	3.9%	\$41.9	-3.5%	NA	NA
VWR (EMEA-APAC)	Q1	31-Mar	\$446.3	3.4%	\$39.6	9.1%	NA	NA
Xylem (Water Infrastructure)	Q1	31-Mar	\$496.0	-3.5%	\$47.0	-13.0%	NA	NA
<b>Other Currencies</b>								
Eurocontrol Technics	Q4	31-Dec	CAD 0.7	78.3%	(CAD 1.2)	-77.5%	CAD 1.0	-28.2%
Eurocontrol Technics	FYE	31-Dec	CAD 1.7	31.0%	CAD 13.0	NM	CAD 11.5	608.9%
HORIBA	Q1	31-Mar	¥45,668	10.7%	¥6,185	19.6%	¥3,778	18.8%
HORIBA (Process & Environmental)	Q1	31-Mar	¥4,194	0.9%	¥173	-74.0%	NA	NA
HORIBA (Scientific)	Q1	31-Mar	¥5,845	-10.3%	-¥61	NM	NA	NA
JEOL	FYE	31-Mar	¥99,698	-7.1%	¥2,076	-66.2%	¥595.0	-85.4%
JEOL (Sci. & Meas. Inst.)	FYE	31-Mar	¥66,510	-10.0%	¥1,271	-72.5%	NA	NA
Pfeiffer Vacuum Technology	Q1	31-Mar	€ 136.9	24.9%	€ 21.4	65.6%	€ 14.8	65.6%
Photon Control	FYE	31-Dec	CAD 32.2	16.7%	CAD 9.4	-9.6%	CAD 6.5	-29.2%
Shimadzu	Q4	31-Mar	¥106,165	5.1%	¥15,144	12.5%	¥10,646	23.4%
Shimadzu (Analytical & Measuring Instruments)	Q4	31-Mar	¥64,807	7.4%	¥12,309	7.9%	NA	NA
Shimadzu	FYE	31-Mar	¥342,479	0.1%	¥37,089	3.9%	¥26,473	10.8%
Shimadzu (Analytical & Measuring Instruments)	FYE	31-Mar	¥209,237	0.4%	¥33,052	0.3%	NA	NA
SYGNIS	FYE	31-Dec	€ 1.8	222.3%	(€ 4.0)	-4.1%	(€ 4.4)	-9.4%
ZEISS	6 Mo.	31-Mar	€ 2,550.0	9.8%	€ 384.0	37.1%	NA	NA

