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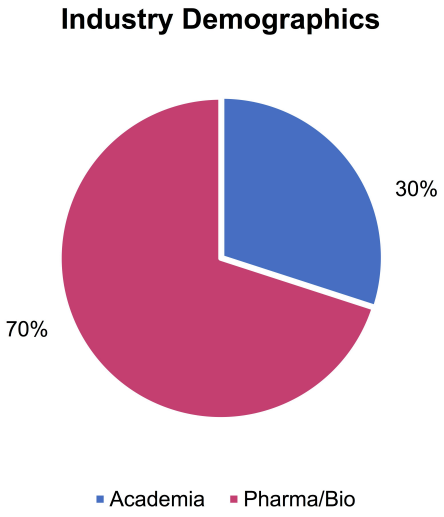
Beyond the Hype: Survey Examines Scientists' Opinions on Impact of New Technologies

Pure pomp or proven performance? In today's digital age when everything is touted as the greatest thing ever, it can be difficult to separate hype from actuality. With so many advanced innovations in life science over the last decade, it seems as though each new technology is framed as being a game-changer in the industry. ***IBO*** asked the people working at the forefront of these technologies—scientists—their opinions on some of the most recent technological advancements to enjoy wide publicity in order to get a grasp on the perception beyond the press reels.

In a survey of 168 US-based scientists in academia and the pharmaceutical/biotechnology industry conducted in late August by BioInformatics LLC's Science Advisory Board, respondents indicated the technologies that they were most and least skeptical about, from a choice of bioinformatics, CRISPR, NGS, single-cell analysis and synthetic biology. Respondents were largely principal investigators, staff scientists, lab manager/director/supervisors, professors and department heads.



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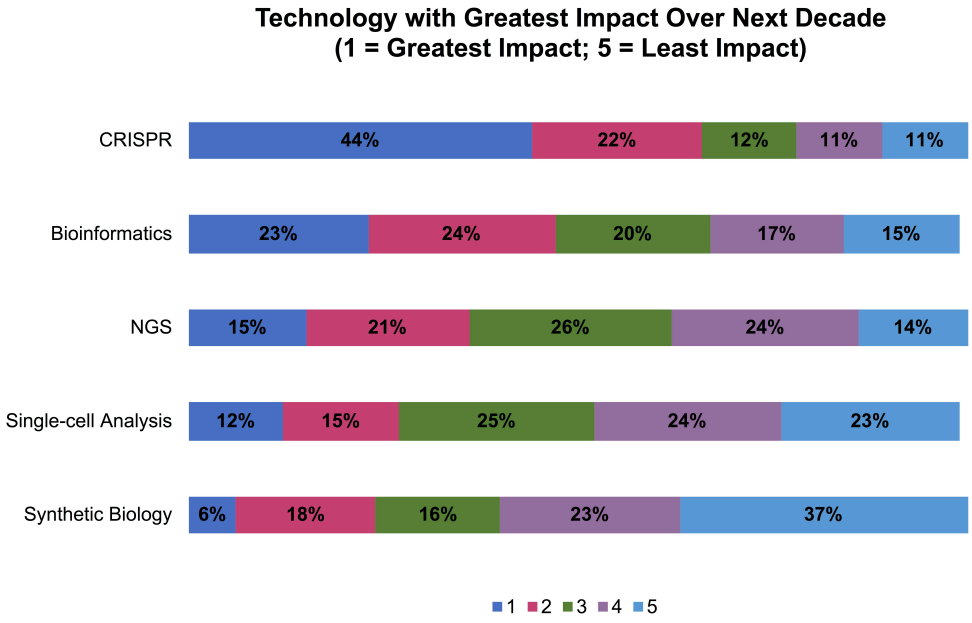
A vast majority of respondents believe that, of the five technologies, CRISPR will have the greatest impact on life science research over the next 10 years. By segment, 27% of academic respondents and 44% of pharma/biotech respondents cited CRISPR as the technology with the greatest potential. Synthetic biology was the least likely to have a major impact on life science, with 12% and 5% of academic and pharma/biotech respondents, respectively, ranking it the lowest.



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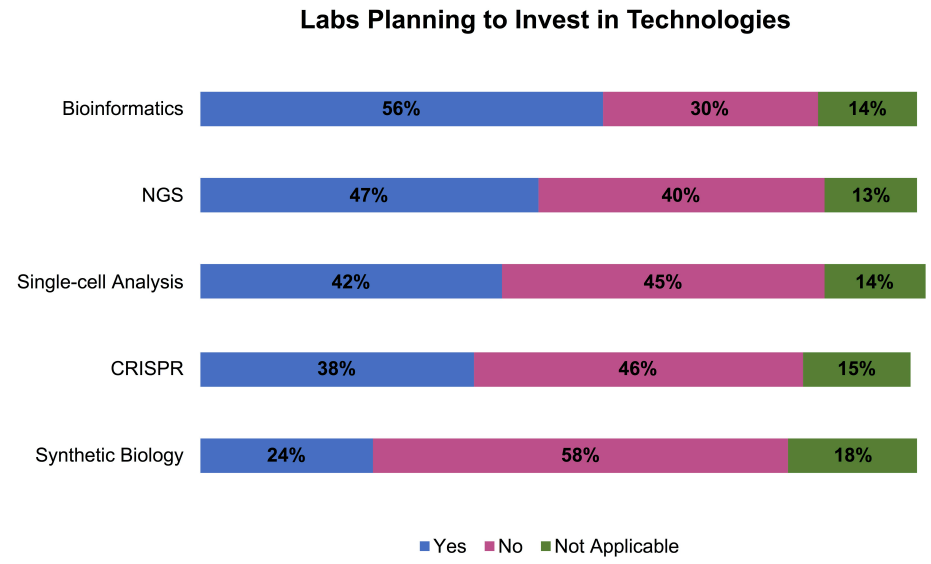
Even though they indicated CRISPR as being the most influential technology, when it comes to investing in these technologies, 56% of labs surveyed have already invested in bioinformatics and 39% have purchased NGS products. Most labs, or 47% of respondents, plan on continuing to invest in NGS, with 42% of respondents continuing to invest in single-cell sequencing. Thirty-eight percent of respondents already invest in CRISPR and 46% would like to invest in CRISPR, with the majority of these respondents from the pharma/biotech sector.

Exactly 100 respondents indicated that they would like to invest in bioinformatics, with 53% of academic respondents and 62% of pharma/biotech respondents interested in the technology. Again, synthetic biology scored the lowest, being the least likely technology for new investments in the future.



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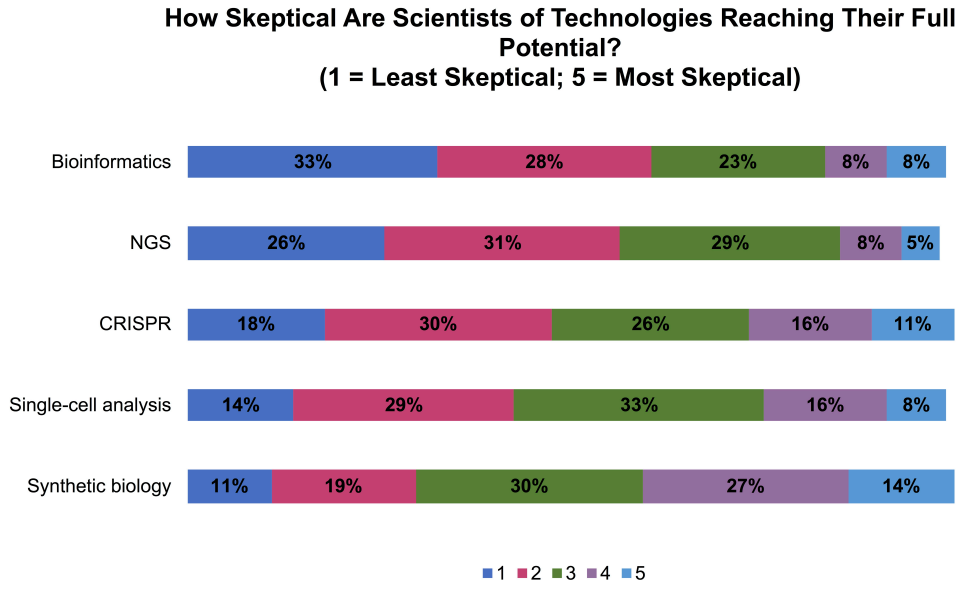
Keeping with this general trend, scientists also believe that synthetic biology is the least likely technology to deliver on its full potential. On a scale of 1 to 5, with 1 being least skeptical and 5 being most skeptical, 71% of respondents scored synthetic biology as a 3, 4 or 5. This was true for both the academic and pharma/biotech sectors. In contrast, bioinformatics was indicated as the technology most likely to deliver on its potential, with 61% of respondents scoring bioinformatics at a 1 or 2. More than half of both academic and pharma/biotech respondents each expressed a low skepticism for bioinformatics.

Respondents were also confident in NGS, with 57% rating NGS as a 1 or 2. By segment, 52% of academic respondents and 58% of pharma/biotech respondents indicated NGS as being low on the skepticism scale. Interestingly, as influential as scientists believe CRISPR to be, 53% of respondents scored CRISPR as a 3, 4 or 5, indicating 39% of all scientists surveyed are skeptical of the promises of CRISPR. Of this, 47% were academic respondents and 53% were pharma/biotech respondents.



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In regards to brand recognition, Illumina was undisputedly the company most associated with NGS, while Thermo Fisher Scientific was cited as the company most associated with bioinformatics. Editas Medicine, Invitrogen (Thermo Fisher), Sigma (MilliporeSigma) and Thermo Fisher were most associated with CRISPR. Thermo Fisher, Fluidigm and 10X Genomics were most commonly associated with single-cell analysis. Thermo Fisher was also most associated with synthetic biology, with Gingko Bioworks and Integrated DNA Technologies also being mentioned most frequently.

The survey results indicate that labs are willing and open to investing in innovations in bioinformatics, and generally believe in the potential of NGS. Planned investments in synthetic biology are slim compared to other new technologies, and most scientists surveyed do not see it as an influential technology compared to others. Though respondents view CRISPR as the technology most likely to change the game in life science, it is interesting to note the large group of scientists who, although they admit CRISPR's vast impact, do not necessarily believe that it will live up to its hype.

Rapid DNA Testing: New Law, New Users

Signed into US law last month, the Rapid DNA Act of 2017 marks a new chapter in the development of the market for "Rapid DNA" technology. The bill was introduced into Congress in 2014. The FBI defines Rapid DNA as "the fully automated (hands free) process of developing a DNA profile from a reference sample buccal swab without human intervention and searching the national DNA database, generally referred to as CODIS [the Combined DNA Index System]."

CODIS processes and stores DNA profiles of offenders, arrestees and forensics (crime scene DNA) so they can be searched to identify possible suspects in unsolved crimes. The DNA profile is based on 20 core autosomal STR loci to uniquely identify an individual. CODIS is used by US local, state and federal law enforcement as well as by other countries. As of July, CODIS, which primarily consists of the National DNA Index (NDIS) database, contained over

12.9 million offender profiles alone.

> ***The systems are also compact, portable and simple to use compared to traditional lab-based technologies, enabling use outside of crime labs.***

In 2013, the first rapid DNA system was introduced. Using microfluidic-based consumables and capillary electrophoresis (CE), the technology reduces analysis time of DNA profiles to less than two hours by removing the manual workflow of multiplex PCR and CE detection. The systems are also compact, portable and simple to use compared to traditional lab-based technologies, enabling use outside of crime labs.

The Rapid DNA Act of 2017 is expected to expand the use of rapid DNA instrumentation and consumables by allowing samples processed at locations other than accredited labs—most prominently, police booking stations—to be uploaded and searched against CODIS. Such systems are currently employed in police booking stations but only for use with local and state DNA databases. In some states, DNA samples of arrestees are collected. Thus, the short testing time can allow for determination of a match prior to a suspect's release or their prolonged detainment.

Two companies, IntegenX and ANDE (formerly Netbio), make Rapid DNA instrumentation. IntegenX provides the RapidHIT 200 system and the RapidHIT ID system. ANDE, which developed its system with GE, supplies the ANDE system (formerly the DNAscan). Thermo Fisher Scientific supplies PCR assays for the RapidHIT ID. The ANDE relies on Promega's PCR assays.

The rapid DNA market has steadily progressed, as updated instruments, lower pricing, technical validation, and the use by labs, police departments and courts for solving crimes and obtaining convictions have proven its suitability, according to Robert Schueren, president and CEO of IntegenX. The Rapid DNA Act of 2017 can be expected to "open more doors," he said.

IntegenX has shipped over 300 systems and 140,000 cartridges, according to Mr. Schueren. Many of the samples tested are now in CODIS. "We have hundreds of thousands of samples in CODIS," he commented. "We're published, uploaded [into CODIS], [have] held up in court and are affordable. It's a great time to be using Rapid DNA."

Introduced in 2015, the company's latest version of its system, the RapidHIT ID system, expanded the capabilities of the company's instrumentation, providing quantification of DNA. The new system also lowered the price per test in part due to a new consumables design. As Mr. Schueren told ***IBO***, the company's latest systems enable testing for $100 per sample, compared to $350 per sample with the launch of the first system. The EXT cartridge, introduced earlier this year, requires only 50 picograms of DNA. In conjunction with the Rapid DNA Act of 2017, the company is offering special pricing as part of "Act in 2017 program": $102,017 for the system and $2,550 per kit ($17 per sample for a 150-sample kit).

The new law also requires standards to be developed for Rapid DNA technology. As Mr. Schueren told ***IBO***, "The FBI has already promulgated standards for labs." However, they need to be modified for use of rapid DNA outside of accredited labs. The current standards cover both rapid DNA as well as modified rapid DNA, which requires a known reference sample and "human intervention and technical review."

Other possible applications of rapid DNA testing include the identification of missing persons and homeland security. For now, the US law's passage promises greater opportunities for adoption.

Bio-Techne Buys Cell Company

Minneapolis, MN 9/5/17; Washington, DC 9/7/17—Scientific product firm Bio-Techne has acquired Trevigen for $11 million in cash. Bio-Techne was previously a distributor of Trevigen's products. "The Trevigen products complement our current product portfolio and make it easier to reach customers interested in products to better understand cell behavior and genotoxic events on cells," commented Bio-Techne President and CEO Charles R. Kummeth. "Having tools to study DNA damage and the apoptotic cell process is an important aspect of understanding drug action. As more drug testing is being conducted on physiologically more appropriate cell models, including 3D cell cultures, having membrane extracts products to support the robust growth of such cells, such as the Cultrex product line,

makes these products an important addition to the Bio-Techne product line." Trevigen was previously a Bio-Techne supplier. The acquisition is expected to be accretive to Bio-Techne's fiscal 2018 adjusted EPS.

The acquisition expands Bio-Techne's range of offerings for cell biology by adding more reagents and kits for applications, such as cancer research, which are also served by Bio-Techne, including its Tocris brand. Trevigen provides reagents and kits for cell research as well as products for physiologic cell culture. It also offers contract services through its Trevigen Cell Assays division.

Metrohm Acquires Electrochemistry Technology Firm

Herisau, Switzerland 9/11/17—Metrohm, a Swiss-based chemical analysis manufacturer, has acquired a majority stake in DropSens. Based in Spain, DropSens provides miniaturized electrochemistry systems, electrochemiluminescence-based systems and spectroelectrochemical technology. Renamed Metrohm DropSens, DropSens is now part of the Metrohm Electrochemistry business. The companies previously partnered to develop screen-printed electrodes and portable electrochemical instrumentation.

Metrohm offers the same products as DropSens, many through its Metrohm Autolab division. According to DropSens, it specializes in miniaturized electrochemistry systems and manufacturing on request. With the purchase, Metrohm expands its R&D and manufacturing capabilities.

3M Food Safety Invests in Allergen Testing

St. Paul, MN 9/7/17—3M Food Safety, a provider of pathogen and hygiene monitoring solutions, has purchased Elution Technologies from Bia Diagnostics and Immunology Consultants Laboratory for an undisclosed amount. Elution supplies test kits for allergen testing of food and beverage products. Its product lines consist of more than 30 lateral flow and ELISA kits for testing food and environmental samples. "Elution Technologies' test kits offer proven technology with an easy-to-use design that delivers fast and accurate results for companies offering peanut-free, gluten-free and other specialized foods for people with certain sensitivities and allergies," commented Polly Foss, general manager of 3M Food Safety.

The acquisition adds a complete portfolio of fast, easy-to-use allergen testing products to 3M Food Safety's offerings. Eric Amann, Business and Integration manager for 3M Food Safety, told **IBO**, *"Other than its 3M Clean Trace Surface Protein tests (pass/fail tests that confirm the presence of proteins, but not specific allergens), 3M Food Safety has thus far not offered a broad set of allergen tests to the market." He also described how 3M Food Safety plans to grow the product line. "In addition to expanding the availability of the assays around the world through its global sales network, 3M Food Safety's leadership and R&D team intend to add to the portfolio of assays over time." He said no employees were involved in the acquisition as Elution had utilized employees of its parent company. Among 3M Food Safety's other product lines are PCR-based food safety testing kits and instruments, and microbiology testing consumables.*

Second Quarter Results: Bio-Techne, Fluidigm, Hitachi High-Technologies, NanoString, Pacific Biosciences and QIAGEN

CY Q2 2017 Results							
	Revenues			Rev. Growth Summary			Adj. Opera
Company	Rev. ($M)	% of Co. Rev.	Growth	Curr.	Acq./Div.	Org. Growth	($M)
Bio-Techne	$156.6	100%	16.2%	-1%	9%	8%	$41.5
Fluidigm	$23.9	100%	-15.1%	0%	0%	-15%	-$9.3
Hitachi High-Tech. (Sci. & Med. Sys.)	¥39,700.0	24%	-13.3%	0%	0%	-13%	¥4,500.0
NanoString Technologies	$34.6	100%	52.9%	-1%	0%	54%	-$3.3
Pacific Biosciences	$20.1	100%	-3.2%	0%	0%	-3%	-$24.4
QIAGEN	$349.0	100%	4.4%	-2%	2%	4%	$74.5

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Bio-Techne Finishes Fiscal 2017 on a Strong Note

Fiscal fourth quarter sales for Bio-Techne advanced 16.2% to $156.6 million. Organically, fourth quarter sales rose 8.0%, for which currency translations negatively impacted sales by 1% and acquisitions lifted sales by 9%. For the full fiscal year, total sales advanced 12.8%, 6.0% organically, to $563.0 million.

Biotechnology sales increased 15.2% to $97.2 million, 2.2% organically, for the quarter. Acquisitions added 14% to segment sales, while currency translation negatively impacted sales by 1%. The strong growth came from antibody revenues, primarily the Novus brand, for which sales grew by double digits. Adjusted operating margin for the quarter was 49.3%, down 3.1 percentage points due to acquisition costs. For the year, segment sales were $364.5 million, a 14.9% increase. Organically, sales rose 4.2%, as acquisitions and currency translations added around 10% to sales growth. Fiscal full-year adjusted operating margin fell five percentage points, again, due to acquisition costs related to Advanced Cellular Diagnostics (ACD).

For the quarter, Diagnostics sales rose 14.0% to $32.6 million. All sales growth was organic. Sales growth for the quarter came primarily from the favorable timing of customers' orders and shipments. Adjusted operating margin for the segment grew 70 basis points to $32.1%, driven by volume leverage. For the fiscal full-year, segment sales increased slightly by 3.0%, organically. Fiscal full-year adjusted operating margin, however, fell 2.4 percentage points to 26.7% due to the margin mix of product sales.

Bio-Techne FYE 2017				
	Q4		FYE	
	Rev. ($M)	Rev. Growth	Rev. ($M)	Rev. Growth
Biotechnology	$97.2	15.2%	$364.5	14.9%
Diagnostics	$32.6	14.0%	$107.1	3.0%
Protein Platforms	$26.8	21.8%	$91.5	18.0%

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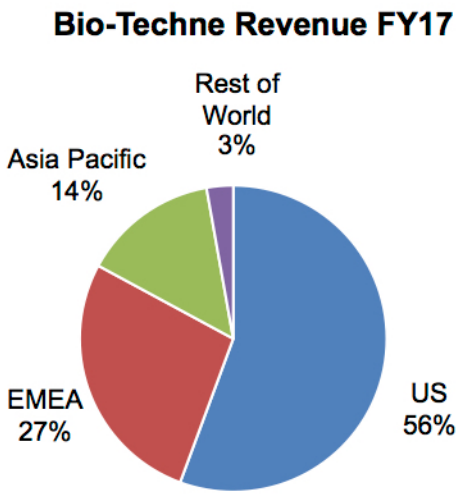
Protein Platform revenue for the quarter leaped 21.8% to $26.8 million. Currency translation unfavorably impacted sales by 2%. Organically, sales grew 23.8%, the sixth consecutive quarter of double-digit organic growth. Segment growth for the quarter was driven by positive Biologics product sales, strong biopharmaceutical end-market demand, and particular strength in the European and Asian regions. Adjusted operating margin for the segment jumped 8.7 percentage points to 16.2% due to strong productivity gains. For the fiscal full-year, segment revenues rose 18.0%, or 19.0% organically, to $91.5 million. Full year adjusted operating margin increased by 5.9 percentage points to 10.5%, driven by strong volume leverage.

Overall, for the life science research market, both segments, Biotechnology and Protein Platforms, combined for an organic revenue growth of 7.0% for the quarter and full year.

For the year, the US represented the largest fraction of the company's total regional revenues, at 56%. Sales in the US grew 13.5% for the year to $313.2 million. Organically, sales for the region grew in the mid-single digits. US

sales were backed by strong biopharmaceutical demand and solid academia end-market sales. For the EMEA region, sales leaped 16.8% to $153.5 million, as Europe experienced strong double-digit growth. Sales for Europe advanced over 10% organically, as biopharmaceutical sales grew over 11% and academic sales increased around 10%.



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In the Asia Pacific region, China experienced the highest sales growth, increasing in the high single digits organically in the fourth quarter. Sales of the company's Western brands grew over 30% in China, which was partially offset by the CFDA's shutdown of immunotherapy due to Baidu's scandal a year ago. For the fiscal full-year, Chinese sales grew 25% for its Western brands. Japan recovered partially, with sales growing in low single digits for the year and mid-single digits for the quarter. The rest of the APAC region continued its strong performance, with sales increasing in the high single digits.

Bio-Techne's outlook for fiscal year 2018 remains positive, as the company believes organic sales growth will be similar to that of the previous year. Bio-Techne expects its Diagnostics segment sales to be higher due to new projects and, conversely, sales for its Protein Platforms business to be slightly softer than the previous year.

Fluidigm Plunges For Second Quarter

Second quarter sales for Fluidigm declined 15.2% to $23.9 million, primarily due to decreases in instruments and consumables revenues. Sequentially, total sales declined 6.3% from the first quarter.

Product revenue decreased 21.0% to $19.5 million. Of the customers in this segment, 73% were research based while 27% were applied based. Instrument revenue declined 24.8% to $9.9 million due to a decrease in sales of genomics instruments, primarily single-cell genomics instruments. Additionally, lower average selling prices of the C1 and Helios systems further added to the decline of sales.

Fluidigm Q2 FY17			
	Rev. ($M)	% Rev. Growth	% of Rev.
Instruments	$9.9	-24.8%	42%
Consumables	$9.6	-17.0%	40%
Service	$4.3	27.4%	18%
License and Grant	$0.1	202.2%	0%

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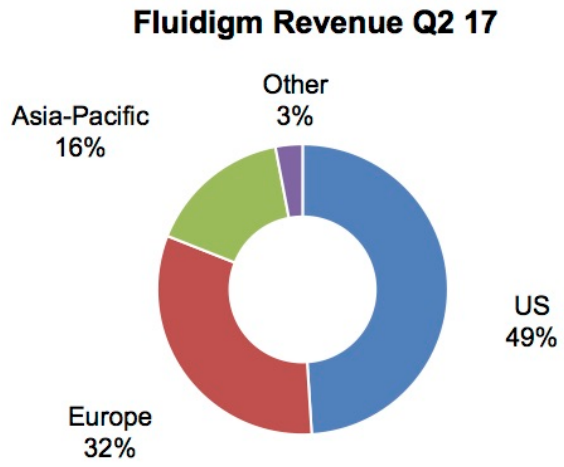
Consumables revenue fell 17.0% to $9.6 million. Despite increased sales for mass cytometry reagents, decreased sales of genomics consumables, in particular IFCs, drove overall consumables revenue down. Service revenue leaped 27.4% to $4.3 million primarily due to an increase in post-warranty service contracts and service parts sales.

Service sales added to both genomic and mass cytometry revenues.

By market, genomics product sales tumbled 35.1% due to lower single-cell and high-throughput genomics revenues. Single-cell genomics product revenue declined at rates in line with company expectations and accounted for around 8% of total product revenue. Conversely, mass cytometry experienced solid demand as consumables and service revenues both increased. Mass cytometry product revenue rose 8.9% to $8.6 million due to strong consumables sales growth. Year to date, mass cytometry revenue growth is up double digits across the instruments, consumables and service segments.



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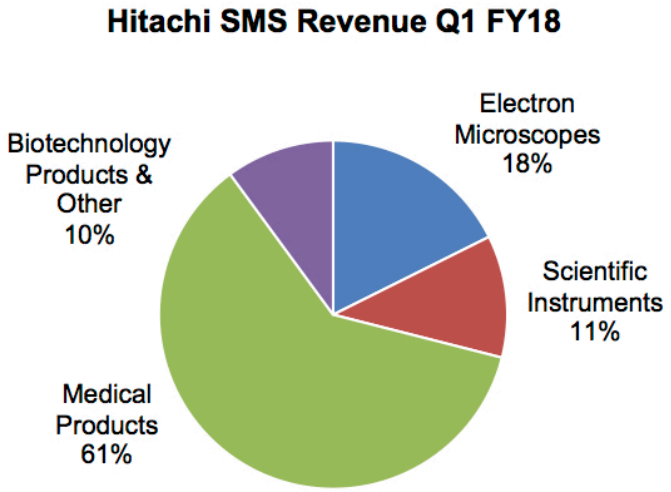
Geographically, all regions experienced a decline in sales. Sales in the US decreased 16.0% to $11.7 million, accounting for 49% of total company revenues. The decrease was largely driven from lower mass cytometry instrument sales as well as lower genomics consumables sales. European sales declined 8.0% to $7.7 million, primarily due to lower genomics product sales. Revenue from the UK represented 13% of total company revenue, while European sales accounted for 32% of total revenues. Revenues for the Asia-Pacific region sunk slightly by 3.0% to $3.9 million, in part due to lower sales for genomics consumables. Revenues from China added $2.8 million to total APAC sales and represented around 12% of total revenues. Revenue for the Asia-Pacific region accounted for 16% of total company revenue. Revenues from other regions decreased 67% to account for 3% of total company revenue.

For the third quarter, Fluidigm expects total revenues of $24–$26 million, an upgrade over the previously projected $22–$24 million. The new projection represents an increase of 8%–17%.

Hitachi Slips for Fiscal First Quarter

For the fiscal first quarter of 2018, Hitachi High-Technologies' Science and Medical Systems (SMS) sales declined 13.3% to ¥39.7 billion ($357.6 million at ¥111 = $1). Similarly, operating income decreased by ¥4.7 billion ($42.3 million) to ¥45.0 billion ($405.4 million).



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Within Hitachi's SMS segment, electron microscopes and biotechnology products grew the fastest, percentage-wise. Electron Microscopes sales vaulted 40.0% to ¥7.0 billion ($63.0 million), representing around 18% of total SMS revenue. The growth came from a strong revival in demand in the Japanese and European regions. Biotechnology Product revenue also grew in double digits, increasing 25.0% to reach ¥4.0 billion ($36.0 million). However, Medical Product revenue fell 27.3% to ¥24.2 billion ($218.0 million), still accounting for a majority of total SMS revenue, at 61%.

Hitachi High-Technologies Science & Medical Systems Q1 FY18			
	Rev. (¥B)	% Rev. Growth	% of Rev.
Electron Microscopes	¥7.0	40.0%	18%
Scientific Instruments	¥4.5	7.1%	11%
Medical Products	¥24.2	-27.3%	61%
Biotechnology Products & Other	¥4.0	25.0%	10%

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For the first half of fiscal 2018, Hitachi High-Technologies expects its SMS segment to record sales of ¥84.6 billion ($762.1 million), representing a decrease of 8.6%. Similarly, operating income is expected to decline by ¥6.4 billion ($57.6 million) to ¥8.1 billion ($72.9 million) due to strategic investments, with hopes of accelerating growth, along with inventory adjustments pertaining to clinical analyzers.

Collaborations Keep NanoString on Top for Second Quarter

NanoString Technologies' second quarter revenues advanced 52.9% to $34.6 million primarily due to a large increase in collaboration sales. Aside from the continued collaborations with Celgene and Merck, total collaboration sales vaulted 216.8% to $16.3 million due to the termination of the Medivation and Astellas collaboration. The termination resulted in an $11.3 million addition to Collaboration revenue. Similarly, Prosigna (IVD) sales leaped 47.9% to $1.8 million, driven by reimbursement decisions in 2016 along with continued expansion of Prosigna acceptance. Collaborations and IVD revenues accounted for 47% and 5% of total company revenue, respectively.

NanoString Technologies Q2 FY17			
	Rev. ($M)	% Rev. Growth	% of Total Rev.
Instruments	$6.0	-6.3%	17%
Consumables	$9.2	1.4%	27%
In Vitro Diagnostics	$1.8	47.9%	5%
Service	$1.2	69.5%	4%
Collaborations	$16.3	216.8%	47%

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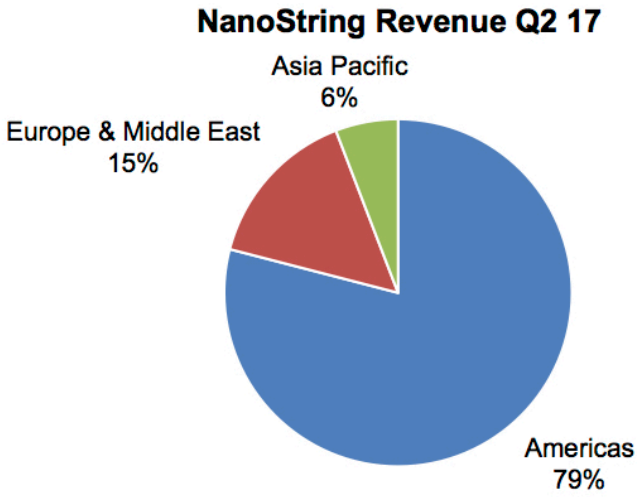
Overall, product and services revenue increased 4.7% to $18.3 million. Instrument sales fell 6.3% to $6.0 million, primarily due to lower volumes in the US and in Europe. The lowered volume in the US and Europe came in response to higher volume in the APAC region, where average sales prices are lower. Instrument revenue, however, increased 35% sequentially. nCounter SPRINT systems accounted for 40% of Instrument sales, while Instrument sales represented 17% of company revenues.

Consumables revenue, excluding IVD sales, grew steadily at 1.4% to $9.2 million. Total consumables revenue, including IVD sales, advanced 7.0% to $11.0 million. Solid Consumables revenue resulted from continued growth of the company's installed base of instruments. Panel products' continued strength lifted sales higher, as they account for over 50% of the company's life science Consumables revenue. Overall, consumables revenue accounted for 27% of total company revenue.

Service revenue increased significantly, by 69.5%, to $1.2 million. The large increase was primarily due to the expansion of instruments covered by service agreements as well as the initiation of sample processing under the company's new Digital Spatial Profiling (DSP) technology-access program. Service revenue accounted for 4% of total company revenues.



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Geographically, the Americas accounted for a majority of total company revenue, at 79%. Revenue for the region increased 67.5% to $27.3 million, where the US represented 98% of the region's revenue. Revenue in the US leaped 70.7% to $26.8 million. Sales for the EMEA region grew 7.3% to $5.2 million, while sales in the Asia Pacific increased 41.0% to $2.0 million.

For the full year, NanoString raised its previous projection of $100–$105 million to $114–$118 million due to the increase and growth in collaboration sales. The upgraded full-year sales projection represents an increase of 32%–36%. Product and services revenue guidance remained the same and, as such, is expected to range between $81 million and $85 million.

Product and Service Revenues Lift Pacific Biosciences

Second quarter revenue for Pacific Biosciences reached $20.1 million, a 17.0% increase, excluding the $3.6 million of terminated contractual revenue (see ***IBO*** 12/15/16).

Instrument sales dropped 17.4% to $7.1 million due to unfavorable customer-installation timing. Conversely, consumables revenue advanced 88.0% to $9.4 million, driven by strong growth in Sequel instrument utilization as well as an increase in the installed base. As of the second quarter, consumables revenue had grown for six consecutive quarters. Consumables revenue generated from the Sequel installed base exceeded those generated from the RSII installed base. The number of installed base systems reached well over 300.

Pacific Biosciences Q2 FY17			
	Rev. (M)	% Rev. Growth	% of Rev.
Product	$16.5	21.8%	82%
Service and Other	$3.5	-1.1%	18%

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Product revenue leaped 21.8% to $16.5 million, largely driven by increased consumables sales. Of the $16.5 million, Sequel and RSII instruments sales reached $7.1 million, accounting for 43% of overall product revenue. The remaining $9.4 million was from the sales of consumables. Service and other revenues slid 1.1% to $3.5 million.

Adjusted product and service gross margin decreased 1.5 percentage points to 39.9% due to higher product costs. Geographically, China represents approximately 25% of total company revenues. The company expects to see continued strength in its China businesses.

For the full year, Pacific Biosciences maintained its guidance for product and service revenue growth of 35%–45%. The company projects a significant improvement in throughput over the next two years, enabling Pacific Biosciences to provide low cost genomes.

QIAGEN Remains Solid in Second Quarter

Second quarter revenues for QIAGEN remained healthy as net sales advanced 4.4% to $349.0 million on a reported basis. Despite fewer working days, the company still produced organic revenue growth of 4.0%, in line with its expectations. Currency exchange movements negatively impacted sales by two percentage points. Acquisitions added about 2% to reported sales, as Exiqon (see ***IBO*** 6/15/16) and OmicSoft (see ***IBO*** 1/15/17) provided solid revenues.

Instrument sales were soft for the second quarter, declining around 4% on a constant currency basis. Instrument sales accounted for 12% of total company sales. Despite strong sales of the QIAsymphony automation system, other instruments saw lower-than-expected sales growth.

Consumables and related revenues for products advanced 8.0% on a constant currency basis. The strong growth was due to continued momentum from the first quarter. Consumables accounted for 88% of total company sales.

QIAGEN Q2 FY17				
	Rev. ($M)	% Rev. Growth	% of Rev.	Rev. Growth (Excl. Currency)
Molecular Diagnostics	$168	4%	48%	6%
Academia	$78	2%	22%	4%
Pharma	$70	5%	20%	8%
Applied Testing	$33	10%	10%	12%

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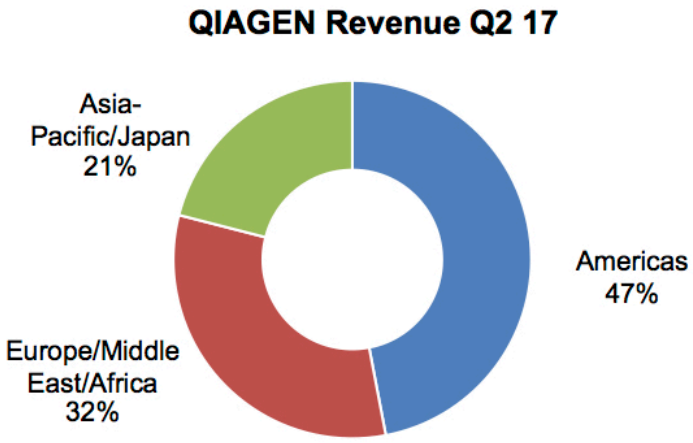
Molecular Diagnostics sales advanced 4.0% on a reported basis and 6.0% in constant currency. Revenue for the segment reached $168.0 million due to strong QuantiFERON TB sales, reaffirming the company's full-year sales target of 25% for the QuantiFERON TB. In addition, QIAsymphony automation system consumables sales increased double digits, furthering segment sales growth. For the quarter, Molecular Diagnostics segment revenue accounted for 48% of total company revenues.

By segment, Academia sales improved slightly, up 2.0% on a reported basis to $78.0 million. On a constant currency basis, sales grew 4.0% as overall regional sales growth increased. Additionally, instruments, consumables and related revenues grew modestly, lifting segment growth higher. Year to date, segment sales have grown 3.0% on a constant currency basis, accounting for 22% of total company revenues.

Pharmaceutical sales rose 5.0% on a reported basis to $70.0 million, but sales rose 8.0% on a constant currency basis. Foreign currency movements negatively affected sales by 3%. The segment experienced strong growth due to substantial gains from consumables and sample technologies sales. Additionally, the EMEA region and the Americas both lifted Pharma sales for the quarter. However, instrument sales slightly offset overall Pharma sales growth. For the quarter, Pharma sales represented 20% of total company sales.

Applied Testing sales grew 10.0% to $33.0 million on a reported basis. On a constant currency basis, sales advanced 12.0%, surging ahead of expectations due to strong volume growth in forensics and human ID testing. Additionally, all regions performed well for the segment, adding positive growth to sales. Applied testing revenue accounted for 10% of total company revenues.



Click to enlarge

Geographically, all regions experienced positive sales growth. Sales in the Americas advanced 4% on a constant currency basis, as adjusted net sales reached $164 million. Steady growth in the Americas came primarily from improved revenues in the US and Brazil. However, revenues from Mexico partially offset the gains due to the timing of a national tender. In the Asia Pacific region, sales jumped 10% on a reported basis, or 12% on a constant currency basis, to hit $74 million. Strong growth for the APAC region was led by robust revenue growth in South Korea, India, and Taiwan. Furthermore, significant growth in QuantiFERON TB sales also lifted the region's overall revenue. However, revenue in Japan remained mostly flat, unchanged from a year ago. In the EMEA region, sales were solid as they advanced 8% on a constant currency basis to $112 million, largely due to strong sales in France and the UK. However, Germany experienced a weaker quarter, as sales declined slightly. As for the Middle East, sales continued to grow and added to overall regional sales growth.

For the third quarter, QIAGEN expects adjusted net sales to grow at about 7% on a constant currency basis, or 6% organically. For the full year, QIAGEN is upgrading its previous sales growth projection of 6%–7% to a whole 7% on a constant currency basis.

Ion Mobility Spectrometry

Ion Mobility Spectrometry (IMS) is an analytical technique that detects gaseous compounds on the basis of their ion mobility. That is, it measures the time needed for the ions of these compounds to drift through an electric field at ambient pressure and temperature. The technique is very fast, sensitive and often ideal for detecting very low levels of compounds or when analysis is needed in the field rather than a laboratory.

The typical ion mobility spectrometer contains four basic components: an inlet system, an ionization chamber, a drift tube and a detector. The sample being analyzed must be in a gaseous state, either naturally or through an appropriate sample preparation technique. After the sample enters the inlet, it is exposed to the ionization source, forming either positive or negative ions. These ions then pass through a shutter that controls the passage of ions in the drift tube.

Inside the drift tube is an electric field and neutral drift gas which separates the ions according to their mobility. High vacuums are not required in this process as they typically are for other MS techniques, thus making these instruments less expensive to construct and better able to miniaturize.

When a gaseous ion from the sample is exposed to a constant electric field at atmospheric pressure, it accelerates until colliding with a neutral molecule. Upon collision, the ion slows down, but the electric field accelerates it again. These collisions repeat until the ion reaches the detector, with the pattern of deceleration and acceleration at the molecular level translating into a constant ion velocity over macroscopic distances. The time it takes for an ion to reach the detector depends on several factors, including the geometric shape, mass and charge of the particle. The resulting ion current is measured by an electrometer as a function of time. The energy gained from the electric field is randomized by ion collisions, and the combination of acceleration and collision results in a constant average ion velocity that is directly proportional to the electric field. The ratio of ion velocity to the magnitude of the electric field is called ion mobility.

IMS technology is ideal for the detection of explosives, narcotics and chemical warfare agents, and is therefore a well-established technique for military and security applications. In fact, IMS is still the main technique used to analyze chemical warfare agents. In recent years, new applications for IMS have been developed as well, including air quality analysis, process control, medical diagnostics and proteomics analysis.

In 2016, the total IMS market was about $330 million, with most sales being attributable to portable or handheld models. Top suppliers of the technology last year included Bruker, Morpho Detection, Nuctech and Smiths Detection. As part of the agreement for the acquisition of Morpho Detection by Smiths in April 2017, the IMS technology formerly owned by Morpho Detection is in the process of being sold to OSI Systems.

While the market for IMS is largely mature for security functions, new applications that involve coupling the technology to mass spectrometry or chromatography systems are showing promise for niche applications, particularly in other functions such as life science research, environmental testing and forensics.

IMS at a Glance:

Leading Suppliers:

- Smiths Detection
- Bruker
- OSI Systems (pending purchase of Morpho Detection IMS)

Largest Markets:

- Government
- Environmental Labs
- Transportation/Shipping

Instrument Cost:

- $10,000–$100,000

Food

A new report that surveyed over 200 US wholesalers, distributors and manufacturers in the food and beverage industry during February and April 2017 indicates that 83% of participants, on average, expect sales to increase 21% and net profits to rise 16% in 2017. Influencing this growth in sales are the growing popularity of private label foods, “free from” foods (i.e., gluten-free, allergen-free, nut-free, etc.) and healthier foods.

Large firms, defined as companies with more than $50 million in annual revenue, expect a 9% jump in sales and an 8% increase in net profits. Small firms, or companies with less than $50 million in yearly revenue, expect a 32% increase in sales and a 23% rise in net profits. Although 60% of respondents expect to increase employee numbers in 2017, with an average projection of a 14% increase, 80% indicated that they do not have plans to expand or change facilities. Seventy percent indicated no change in R&D expenditures and 87% forecast no change in M&A activity.

Although tax changes benefitting the food and beverage industry have been implemented, 61% of respondents do not plan to purchase any new equipment. Although these general results were true for both small and large firms, 45% of large firms plan to invest in new equipment compared to 34% of small firms. Priorities for companies in 2017 include cost of goods, food safety, knowledge and information sharing, and food quality. Major concerns cited by participants were food safety and traceability, as well as new federal regulations implemented through the Food Safety Modernization Act.

Source: *Mazars*

Energy

The latest *International Energy Outlook 2017* report from the US Energy Information Administration forecast that global energy consumption will increase 28% between 2015 and 2040, with the majority of the growth coming from non-OECD countries, especially Asian countries in which economic growth is propelling energy demand. Non-OECD countries in Asia, such as India and China, will comprise over 60% of the total increase in global energy consumption from the time period forecasted.

Although demand from the residential and transportation sectors is growing at a more rapid rate, the industrial sector will still represent more than 50% of energy consumption in 2040. Residential and transportation sector demand is projected to increase, rising by approximately 30% between 2015 and 2040, due to non-OECD countries.

The fastest growing energy source is renewable energy, which is expected to grow 2.3% on average during the time period. However, fossil fuels are projected to remain the chief source of energy in 2040, representing 77% of global energy consumption. Within fossil fuels, natural gas is growing most rapidly, with an expected increase at an average rate of 1.4% per year between 2015 and 2040.

Source: *US Energy Information Administration*

Pharmaceuticals

After a few years of a spike in biotechnology M&A, deal activity is inevitably slowing down in the industry. According to EvaluatePharma, in the first half of 2017, $2.91 billion worth of deals were negotiated. In comparison, there were $5.02 billion and $3.33 billion worth of deals in the second half of 2015 and the first half of 2016, respectively;

however, the 2017 figure is up 33.5% from the second half of 2016. These figures do not include deals for which financial terms were unavailable, as in the case of a total deal value announcement, figures were commonly inflated and unreliable.

From 2013 to 2015, there was a rapid increase in up-front deals in oncology. The largest rise was for early stage assets, such as products in preclinical or phase I testing. Compared to the time period between 2010 and 2016, however, phase II and phase III assets have not shifted much in value, even with the rise of value in early stage assets. Overall, there has been a rise in valuations of phase-based deals. This implies that companies are looking to acquire earlier in order to find potentially successful assets.

Source: *EP Vantage*

UK

Last week, the British government released a policy paper detailing the relationship the country will have with the EU in regards to scientific collaboration and funding. The paper indicates that the UK prefers remaining a member of Horizon 2020 and any succeeding scientific innovation funding programs. In January, the UK announced plans to provide an additional £2 billion ($2.7 billion) each year in R&D funding by 2020–2021, as well as to raise R&D expenditures as a percentage of GDP to 2.4% by 2027 and 3% thereafter.

The paper states that the UK has contributed close to 20% of all research within EU health programs between 2007 and 2016, and highlights the collaborative past the UK has had with the EU in space, clean energy, pharmaceutical and medical research. At the same time, the paper states that the collaboration agreements would have to be negotiated by the UK with EU member states, especially in regards to funds the UK contributes, "which the UK would need to weigh against other spending priorities." The paper states that citizens of EU countries would not be able to come into the UK without a visa, though it will be open to accepting top talent from those nations.

Source: *Department for Exiting the European Union*

Russia

The Russian government is increasing funding for its 5-100 program, a federal project to improve the competiveness of Russian universities and ensure Russia is placed in the global top 100 universities. According to the Ministry of Education and Science, between the period of 2018–2020, funding for the 5-100 program will jump 25.0% to RUB 43.5 billion ($749 million).

The 5-100 program is made up of 21 universities, and the program's mission is to ensure that 5 national universities enter the world ranking of the top 100 universities, as rated by QS, *Times Higher Education* and the Academic Ranking of World Universities. Currently, only Moscow State University has successfully entered the rankings, although it is not part of the 5-100 program. The government has acknowledged that the 5-100 program has not received adequate funding, largely due to the recent economic troubles in the country, which resulted in the 5-100 program's funding being cut 6%. However, due to a brain drain in the country and a need to retain top scientific talent, the government is working to find a way to increase the program's funding.

The 5-100 program also aims to implement technical re-equipment, improved collaboration efforts with international universities, additional promotion of Russian universities and recruitment of international students. Critics of the program state that it fails to adequately represent medical and agriculture universities, and that the 5-100 budget is still too low to provide Russian scientists with the tools they need to compete with international universities.

Source: *University World News*

China

According to a report from the National Science Library of the Chinese Academy of Sciences, Springer Nature and China's National Center for Nanoscience and Technology, China's nanotechnology industry has been on a steady rise, with the country's patent applications for nanotechnology-related products among the highest in the world. Over the past 20 years, China has applied for 209,334 nanotechnology patents, representing 45% of all nanotechnology patents in the world.

In 1997, there were approximately 13,000 papers published on nanotechnology worldwide, and by 2016, 154,000 nanotechnology papers had been published. During the same time span, China's contribution to nanotechnology papers jumped from 820 to more than 52,000. The average CAGR of the most-cited Chinese nanotechnology papers has been 22% since 2007, which is 3 times the global growth rate.

China's nanotechnology industry is booming in part due to robust funding for nanoscience, with foreign-trained scientists returning to China for lucrative nanotechnology research policies. Many scientists are working in the fields of energy nanotechnology and catalytic nanomaterials through research on batteries and energy storage and conversion, especially as China has been investing in new energy R&D, and environmental protection and energy efficient technologies. Catalytic nanomaterials R&D is thought to be the nanoscience field with the most potential in China, as it can accelerate chemical reactions and help the chemical industry and in oil refineries. The Chinese Academy of Sciences plans to help further bridge the gap between basic and applied research through collaborating internationally and focusing on homegrown scientific talent.

Source: *China Academy of Sciences*

Broad-based Companies

Company Announcements

Brooks Automation acquired **Pacific Bio-Material Management** (PBMMI) in July for $33 million. PBMMI provides services for biological sample storage and cold chain logistics. PBMMI posted revenues of $12 million for the last 12 months.

In July, **Thermo Fisher Scientific** announced that **Linkage Biosciences** has joined its Transplant Diagnostics business. Linkage supplies LinkSēq real-time PCR genotyping kits.

In its second quarter **SEC** financial filing, **Thermo Fisher Scientific** disclosed that it purchased **Finesse Solutions** for $221 million, net of cash acquired (see ***IBO*** 2/15/17). Finesse Solutions recorded 2016 revenues of $50 million. It also reported that it acquired **Core Informatics**, which has annual revenues of $10 million, for $94 million (see ***IBO*** 3/15/17).

In July, **Agilent Technologies** named **MIT**'s Ram Sasisekharan, PhD, as a recipient of its Agilent Thought Leader Award in recognition of his contributions in the field of biologics characterization. He work aims to shorten the development time between product "design" to the clinic.

Waters announced in its second quarter conference call that it has integrated its Waters-branded product groups, including LC, MS, chemistries and informatics, into one R&D group, led by Ian King, senior vice president of Instrument Technology.

Teledyne Technologies' second quarter Environmental sales grew 13.6%, led by sales of air monitoring instruments and the acquisition of **Hanson Research** (see ***IBO*** 12/15/16).

Illumina announced in July a sixth cycle of start-ups funded by the Illumina Accelerator (see ***IBO*** 4/30/14). The companies are: **Checkerspot**, a developer of high-performance materials; biotherapeutics firm **Chimera Bioengineering**, which is building RNA-based gene regulatory systems to control engineered cell therapies; digital

health company **Encompass Bioscience**; **Matra Bio**, which is creating an exosome intelligence platform for drug discovery; and microbiome therapeutics firm **Solarea Bio**, which is developing a platform for probiotic treatments derived from natural sources. Since 2014, the Accelerator has invested in 18 start-ups.

PerkinElmer reported in its second quarter **SEC** financial filing that it purchased **Tulip Diagnostics** (see ***IBO*** 1/15/17) for $127.3 million.

Bruker acquired in August technology for a field portable, electrochemical chip–based detection instrument, the portable Bio-Detection integrated (pBDi), and associated consumables kits for onsite, fast identification of selected bacteria, viruses and toxins. The electrochemical immunoassay can detect and identify up to 6 biothreats per assay chip, typically within 20 minutes and without prior culturing.

In August, **Hitachi High-Technologies** announced it is developing the cloud-based ExTOPE integrated Internet of Things (IoT) portal for its analytical instrumentation. The portal will collect, store and manage measurement data and equipment operation data from Hitachi systems. The company plans to also provide applications.

Malvern PANalytical announced in August a collaboration with IoT specialist **TetraScience** to deploy IoT-enabled capabilities and connectivity for its instruments, with the objective of providing access to customized dashboards, data collection and analytics, and system scheduling and monitoring. The first phase will focus on the Empyrean XRD spectrometer and the Mastersizer 3000 laser diffraction system. The connections will be vendor agnostic.

Second quarter revenues for **Harvard Bioscience** declined 3.5% to $25.2 million (see ***IBO*** 7/31/17). Organic sales grew 1%, as currency effects reduced sales growth by 2.1% and the divestment of **AHN** (see ***IBO*** 10/31/16) cut growth by 1.4%. Adjusted operating profit rose 35.1% to $1.7 million.

Effective September 1, **Merck KGaA Life Science** CEO Udit Batra assumed responsibilities for Merck KGaA's business technology activities.

In August, **Eppendorf** reported first-half sales grew 7.3%, 6.6% when adjusted for currency, to €327.9 million ($354.5 million) (see ***IBO*** 8/15/17). EBIT margin rose three-tenths of a percentage point to 19.3%.

Eppendorf announced in September the appointment of Eva van Pelt to its Management Board, effective October 1. She will assume responsibilities for Commercial Organization (sales, marketing and service). She previously served as managing director for the EMEA region at **Leica Microsystems**.

In an August **SEC** filing, **Becton, Dickinson** announced the retirement of Ellen R. Strahlman, executive vice present, Research and Development, and chief medical officer, effective December 31

In August, **Oxford Instruments** announced plans to increase the number of personnel at its R&D facility at the **Industrial Technology Research Institute in Taiwan**, and strengthen the organizations' cooperative relationship. The cooperation agreement now includes MEMS, micro-LED, silicon photonics, and other semiconductor optoelectronic components and equipment technology. The organizations have worked together since 2006.

Bruker announced in its second quarter **SEC** filing that in May the **Korean Public Prosecutor's Office** declined pursue criminal proceedings against the company related to allegations of improper bidding for x-ray systems in 2010 and 2012 (see ***IBO*** 2/28/17). From December 2016 to June 2017, several government entities imposed suspensions on the company. South Korea accounted for less than 1% of Bruker's 2016 revenues.

In August, **Xylem** named Jeanne Beliveau-Dunn to its Board, bringing the total number of directors to 10. She currently serves as vice president and general manager of **Cisco**'s Technical Services.

PerkinElmer India opened a Centre of Excellence at the **Indian Institute of Science Education and Research, Pune**, in August. The facility houses PerkinElmer systems for high-throughput analyses in life science. The company currently has more than 10,000 customers and over 450 employees in India.

In August, **VWR** opened a regional distribution center in Missouri City, Texas.

Scientific product and technology firm **Scientific Digital Imaging** acquired **Applied Thermal Control** (ATC), a provider of cooling systems for scientific instrumentation, in August for £686,000 ($879,487) and a total

consideration up to £1.2 million ($1.5 million). ATC recorded 2016 revenues of £1.2 million ($1.6 million).

In August, **MilliporeSigma** announced the opening of its first global Food Safety Studio in Bellevue, Washington. The Studio is designed for manufacturers of all types of food to collaborate with MilliporeSigma on developing products for the rapid detection of foodborne pathogens.

In September, Wisconsin Governor Scott Walker announced that **MilliporeSigma** plans to expand its facility in Sheboygan Falls, Wisconsin, by 80,000 ft^2 (24,384 m^2). The expansion will consolidate the company's Flavors & Fragrances and Stains & Dyes operations. The expansion is expected to create 175 jobs over three years. Wisconsin is home to four of the company's manufacturing sites and a distribution center.

The *IrvineTimes* reported in September that **Merck KGaA** is undertaking a £1.3 million ($1.7 million) expansion of it Irvine facility in Scotland. The facility produces liquid and powder cell culture media. The expansion will add capacity for production of an addition two million liters of media.

Effective September 1, **Elementar** Founder Dr. Hans-Peter Sieper stepped down as president of the company but now serves on the supervisory board. His son, Albrecht Sieper, replaced him.

In September, **Sartorius** announced the opening of a new €42 million ($46 million), 270,000 ft^2 (25,000 m^2) manufacturing facility at its campus in Göettingen, Germany. The new building combines manufacturing that was formerly located at different sites.

Molecular Spectroscopy

Company Announcements

In June, NMR and MRI maker **NIUMAG Analytical Instruments** named **ACTTR Technology** as a distributor for Taiwan.

Cannabis lab **CW Analytical Laboratories** announced in June that it will distribute **Orange Photonics**' Lightlab portable cannabis analyzer in California. The system utilizes Selective Separation Spectroscopy, a combination of LC and spectroscopy.

In July, **ASD**, a **PANalytical** company, named **Aimil** as a distributor for India.

Hinds Instruments appointed **Bio-Logic Science Instruments** in July as the exclusive distributor of its CD (Circular Dichroism) Microplate Reader, which is designed for high-throughput screening of chiral pharmaceuticals.

In August, **BrightSpec**, maker of FT–molecular rotational resonance systems, announced an exclusive distribution partnership with **Cornes Technologies** for Japan.

In September, **Magritek** named **Quantum Design** as a distributor of its benchtop NMR systems in South America.

Quantum Analytics announced in September an exclusive US distribution agreement with **Aspect Imaging** NMR and MRI products.

Product Introductions

AMETEK Grabner Instruments introduced in June a high-speed, compact, FT-IR fuel analyzer, ideal for field or mobile testing, for measurements of gas, and jet and diesel fuels. Compared to the previous model, analysis speed is 10 times faster.

In June, **Instrument Systems**, a **Konica Minolta** company, previewed the LumiCam 2400 imaging photometer and colorimeter for the characterization of displays, control and display elements. It will be available this fall.

In July, **Viavi Solutions** introduced the MicroNIR Transmission Fixture sampling accessory, a compact fixture used for the transmission analysis of liquids, and/or thin filters and films.

Viavi Solutions released in August the MicroNIR Tablet Probe, a handheld probe attachment for the analysis of pharmaceutical tablets and pills, small-volume samples and single grain kernals.

Brazilian firm **Fine Instrument Technology** announced that its SpecFIT low-field NMR for the analysis of food products will be launched later this year.

In August, **PerkinElmer** introduced the Spectrum Two N FT-NIR System for analysis of a wide range of pharmaceutical, food and industrial samples. Among the customizable features are a plug-and play NIR reflectance, heatable transmission and remote sampling modules.

Shimadzu released in July an update to its LabSolutions analytical data management system, which adds support for its UV/Vis and FTIR spectrophotometers and spectrofluorometers.

Unchained Labs debuted in August the Lunatic UV/Vis system for batch quantification of protein, DNA and RNA. It can measure 96 samples, each with a volume of 2 µL, in 5 minutes, according to the company.

In September, **Cole-Parmer** launched the Jenway Genova Bio UV/Vis spectrophotometer for life science applications. It measures the wavelength range of 198–800 nm simultaneous in under 3 sec.

Sales/Orders of Note

In July, **SCiO** announced the that agri-food firm **Cargill** launched a precision agriculture service for dairy farms based its handheld Reveal spectrometer. The service will analyze the nutritional content of a herd's feed.

Bruker announced in August that the **Hungarian Ministry of Agriculture** selected its NMR FoodScreener for wine profiling. **Diagnosticum** and Bruker will form the **Hungarian Wine Consortium** to authenticate and identify Hungarian wines. Participation in the program is required for all Hungarian wine makers.

Atomic Spectroscopy

Company Announcements

In June, **Malvern PANalytical** announced the opening an refurbished application lab at its site in Almelo, the Netherlands.

Judges Scientific announced in July the acquisition of **Crystallon**, the holding company of **Oxford Cryosystems**, for £4.5 million ($5.8 million) in cash. Oxford Cryosystems manufactures cryogenic cooling systems for x-ray crystallography and other applications. The products are sold to OEMs for integration into XRD systems or directly to users. For the year ending November 30, 2016, the company recorded revenues of £4.7 million ($6.0 million) and pre-tax profits of £4.3 million ($5.5 million)

Product Introductions

In July, **PANalytical** launched the Epsilon 1 XRF spectrometer, which is designed for small spot analysis and can analyze a large variety of sample types.

Rigaku released in July the Rigaku ZSX Primus 400 sequential WD-XRF spectrometer, specifically designed for very large and/or heavy samples. It offers micro-mapping capabilities and a customized sample adapter system.

In August, **Rigaku** debuted the NANOPIX mini, calling it the world's first benchtop SAXS system that delivers

automated nanoparticle size–distribution analysis for both QC and R&D applications. Features include ultra-SAXS measurements and suitability for opaque suspensions.

Rigaku launched in August the Simultix 15 high-throughput WD-XRF spectrometer for process control in industry such as steel and cement. It features a 30 fixed-channel configuration that can be upgraded to 40 channels.

In July, **Bruker** introduced the LYNXEYE XE-T 1-D compound silicon strip detector for its D2 PHASER XRD system. It features four times better energy resolution than traditional silicon strip detectors.

Bruker released in August the D8 VENTURE BIOTOOLS for lab macromolecular crystallography. Among its tools are the ImS DIAMOND, which the company calls the world's brightest microfocus x-ray source, and the new PHOTON II, which it calls the largest photon counting pixel array detector for the home lab.

In August, **Bruker** and **DECTRIS** debuted the EIGER2 R 500K hybrid photon counting pix detector. The detector has been integrated into Bruker's D8 ADVANCE and D8 DISCOVER XRD systems. With the new detector, switching between 0D, 1D and 2D mode is possible.

Bruker unveiled in September the D8 DISCOVER PLUS XRD system, combining the new TXS-HE high-efficiency Turbo X-ray Source with the ATLAS goniometer. It reduces data collection time and enables the study of dynamic processes.

SPECTRO Analytical Instruments unveiled in August the SPECTRO MIDEX MID05 small spot ED-XRF spectrometer, its fifth generation small spot ED-XRF system for precious metal testing. It features faster testing times, increased precision and ease of use.

In August, **Teledyne CETAC Technologies** introduced the Aridus3 Desolvating Nebulizer System for its nebulizer product group. It is the fourth generation of a specialized liquid sample introduction accessory for ICP-MS.

Nu Instruments debuted in August the SAPPHIRE collision/reaction cell multi-collector ICP-MS (MC-ICP-MS). It can be used as a traditional MC-ICP-MS as well as featuring a low-energy path in which the ion beam is directed through a hexapole collision cell for the removal of the ICP-induced molecular species that interfere directly with the atomic ions of the same nominal mass of some nontraditional isotopes. More than 170 of the the company's MC-ICP-MS systems have been installed.

In August, **XOS** launched the Petra MZX, a new HD-XRF-based D4294 analyzer for combined analysis of 13 elements. It delivers repeatable sub-ppm measurements of metals like nickel, vanadium and iron combined with sulfur measurements as low as 5.7 ppm.

Shimadzu introduced in August the EDX-8100 ED-XRF spectrometer, featuring the ability to analyze light elements in liquid samples with high sensitivity by helium purging. More than one thousand of the EDX-7000 and EDX-8000 ED-XRF spectrometers, the previous platforms, have been sold.

Sales/Orders of Note

In August, **Spectro Scientific** signed a $9.6 million contract with the **US Navy** for the delivery of up to 69 model M-N/W SpectrOil RDE spectrometers.

Life Science Consumables

General Life Science Consumables

Company Announcements

Streck announced several new distribution agreements: **Hamdan** for Jordan, **Innovative Medical Solutions** for Kuwait and **TK Biotech** for Poland.

In August, **BioLegend** announced construction of a new BioLegend Campus near San Diego, California, which will include a new main building. The Campus is scheduled to be completed in March 2019.

BioIVT (formerly **BioreclamationIVT**), a provider of biospecimens and related products, acquired **Asterand Bioscience** in August. Asterand supplies high-quality, well-characterized human tissue and research solutions with a focus on the oncology market.

In August, chemical-intermediates firm **Biosynth** licensed rights to manufacture and sell chemiluminescent reporter molecules from **Tel Aviv University**. Biosynth will sell the technology to kit manufacturers. Developed by Professor Doron Shabat, the AquaSpark series of Dioxetane-based probes for use in research and diagnostics applications can be used as single agents, have high efficiency and sensitivity and can work in vivo or ex vivo.

Cell Signaling Technology announced that starting January 2018 it will sell directly in Germany and Austria

Gene-based Consumables

Company Announcements

New England Biolabs joined the **EMBL Advanced Training Centre** in July as part of the EMBL's Corporate Partnership Program.

Also in July, **New England Biolabs** partnered with **TTP** to offer services for molecular diagnostic technology developers, including product development services spanning instruments, consumables and reagents.

In August, **Horizon Discovery**, and its partners the **Sanger Institute** and **Eagle Genomics**, published a complete, high-quality, well-annotated sequence of its GS Knockout CHO-K1 bioproduction cell line to enable quality-by-design bioproduction cell line development.

Merck KGaA announced in August that the **European Patent Office** issued a "Notice of Intention to Grant" for its patent application covering the company's CRISPR technology used in a genomic integration method for eukaryotic cells.

In September, **Canon BioMedical** named **Sanbio** as a distributor of the Novallele genotyping assays, controls and reagents in Belgium, the Netherlands and Luxembourg.

DNA Script, a manufacturer of de novo synthetic nucleic acids using an enzymatic technology, announced a Series A funding of $13 million, led by **Illumina Ventures** and including **M Ventures**, the corporate venture arm of **Merck KGaA**. The funding will be used to strengthen DNA Script's platform in order to manufacture high-quality oligonucleotides faster and more affordably than the current market standard.

In September, **Agilent Technologies** announced **US FDA** 501(k) clearance of its GenetiSure Dx Postnatal Assay, its first CGH assay for diagnostic use. The array provides data on CNVs and absence of heterozygosity in genomic DNA obtained from peripheral whole blood in patients who have been referred for chromosomal testing based on clinical presentation. It was previously available only in Europe.

Product Introductions

Empirical Bioscience introduced in July the 2X qPCR Probe Master Mix for probe-based quantitative PCR applications. The Mix can amplify down to 10 copies of human genomic DNA.

In July, **Synthego** announced the available of modified synthetic sgRNA libraries for arrayed whole human genome CRISPR screening.

Thermo Fisher Scientific introduced in July the Applied Biosystems Axiom Asia Precision Medicine Research Array for research screening initiative. It contains more than 750,000 biomarkers associated with both common and rare diseases for clinical research studies. Fifty thousand custom markers can also be added.

In August, **BellBrook Labs** released the AptaFluor SAH Methyltransferase Assay, a high-throughput assay for targeting epigenetic pathways, calling it "the first-of-its-kind homogenous assay using aptamers for high-throughput screening. It uses a mix-and-read format with a far red positive TR-FRET readout.

SwissDeCode introduced in September the portable, self-administered DNAFoil pork DNA test for use in monitoring halal and kosher supply chains.

In September, **Bio-Rad Laboratories** launched in the US the ZDC multiplex RT-PCR assay, which allows researchers to simultaneously screen samples for Zika, dengue and chikungunya arbovirus RNAs. It features up to five-plex capability and a one-step protocol. The kit can run 200 reactions.

Benson Hill Biosystems released in September CRISPR 3.0, a novel family of Cms1 nucleases, as part of its suite of genomic tools to accelerate crop performance improvements.

Cell-based Consumables

Company Announcements

In September, **BioIVT** acquired **Qualyst Transporter Solutions**, which provides in vitro hepatic models and services.

Product Introductions

In August, **Miltenyi Biotec** released the NK MACS Medium, a human cell culture medium for the cultivation of human natural killer cells.

ibidi launched in September the Fuse-It-siRNA transfection reagent for rapid and efficient gene silencing with the highest biocompatibility. It is based on an endosome-independent method.

Sales/Orders of Note

In August, **Thermo Fisher Scientific** announced that its specifically developed Cell Therapy Systems Dynabeads technology was utilized for **Novartis**' Kymriah, the first US FDA-approved CAR-T cell therapy.

Protein-based Consumables

Company Announcements

Antibody provider **Proteintech** named **Uniscience** as a distributor for Brazil in May.

In August, **Atlas Antibodies** named Jon Daicic as CEO. He previously served as acting general manager for BioProcess Downstream Hardware at **GE Healthcare**.

Product Announcements

TTP Labtech and **Abcam** partnered to introduce sol-R reagent kits based on TTP's Sol-R coded beads, which are designed for secreted protein quantification in multiplexed no-wash immunoassay screens. Abcam is providing antibody technology for the kits.

In September, **Vector Laboratories** launched the VectaFluor Duet kit offering ready-to-use immunofluorescence double labeling. It features a secondary reagent to detect mouse and rate primary antibodies with green and red DyLight fluorescent dyes and a normal blocking serum.

R&D Systems, a **Bio-Techne** brand, debuted in September the new XL Cytokine Discovery **Luminex** High Performance Panel, featuring the capability to simultaneously measure the amount of 35 different analytes.

Reported Financial Results

$US	Period	Ended	Sales	Chg.	Op. Prof.	Chg.	Net Prof.	Chg.
Genscript Biotech	H1	30-Jun	$63.4	19.1%	$18.1	11.8%	$15.1	14.6%
IDEX (Health & Sci. Technology)	Q2	30-Jun	$204.4	9.6%	$46.3	12.6%	NA	NA
Other Currencies (in Millions)								
Abcam	FYE	30-Jun	CAD 217.1	26.5%	CAD 55.1	19.0%	CAD 42.4	13.2%
Advanced Holdings	Q2	30-Jun	SGD 8.0	-62.7%	(SGD 0.9)	47.1%	(SGD 1.2)	19.4%
Borosil Glassworks (Scientificware)	Q1	30-Jun	INR 236.2	-0.3%	INR 27.1	-22.8%	NA	NA
DKK-TOA	Q1	30-Jun	¥3,091.0	4.1%	¥185.0	52.9%	¥73.0	170.4%
Eurocontrol Technics	Q2	30-Jun	CAD 0.7	79.8%	(CAD 1.3)	22.7%	(CAD 1.0)	22.4%
EuroTech	H1	30-Jun	€ 22.0	-22.6%	(€ 6.9)	-128.1%	(€ 7.0)	-149.8%
Immuno-Biological Laboratories	Q1	30-Jun	¥132.0	-5.7%	(¥ 59.0)	-18.0%	(¥ 61.0)	1.6%
Park Systems	Q2	30-Jun	KRW 4,908.0	31.5%	KRW 488.0	NM	KRW 870.0	NM

NA = Not Available, NM = Not Meaningful
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