



# IBO

**Strategic Information for the  
Life Science and Analytical  
Instrument Industry**

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## Instrument Business Outlook

This document represents a sample issue of Instrument Business Outlook (December 15, 2020).

IBO is the leading source for news, data and analysis about the \$50 billion analytical instrument and laboratory products industry. IBO informs company executives, suppliers and investors, delivering a comprehensive view of the industry, its business dynamics and market trends. IBO gives readers information essential to guiding strategy, tracking competitors and gaining industry knowledge.

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## Lab Tool M&A 2020: Activity Picks Up

Although the COVID-19 outbreak may have slowed M&A activity across many industries earlier this year, there is evidence that this trend has reversed itself. This is true for the scientific tool industry as well.

There were no multi-billion dollar plus acquisitions involving life science assets in 2020, although Thermo Fisher Scientific tried, before abandoning its plan to buy QIAGEN for \$11.5 billion (see *IBO* 8/15/20). In fact, the industry's most dominant companies largely stayed on the sidelines, except for PerkinElmer with its planned purchase of Horizon Discovery (see *IBO* 11/15/20).

However, in two other sectors of the analytical tool business, deals topped \$1 billion. Sensor firm and industry outsider Amphenol announced this month its intention to purchase MTS Systems, a provider of physical testing instrumentation for materials characterization, for \$1.7 billion (see Executive Briefing). Even so, the deal's price-to-sales ratio of 1.9 was not among the top five this year. Another multi-billion deal was struck when chemicals firm Royal DSM acquired food testing firm Romer Labs (see *IBO* 6/15/20) as part of its \$1.1 billion takeover of Erber, an animal health and nutrition company. In both deals, the laboratory tools were a segment of the acquired company's assets and not the primary driving factor behind the purchases, but nonetheless brought new competitors in the respective markets.

In *IBO's* annual review of M&A activity (purchase of a majority stake in the company or the entire company), we examine the acquisition activity reported in *IBO* between December 31, 2019, and December 15, 2020. Our analysis includes only pure-play deals, excluding acquisitions of dedicated diagnostic or process (analyses conducted inline and online during manufacturing) companies, even if made by a lab product company. The financial figures presented are drawn from available sources. Sales and purchase prices were not available for all announced acquisitions and thus these purchases are not listed in the article's tables.

## M&A in General

For companies in many industries, factors such as the global impact of the COVID-19 pandemic and the recently completed US presidential election were the main influences of companies participating in M&A in 2020. According to Deloitte's "M&A Trends Survey: The future of M&A," a September survey of 1,000 executives across industries, 61% believed that M&A activity will reach pre-pandemic levels within the next 12 months and assist companies in recovery in a post-COVID-19 economy. The most significant percentage of executives, 57%, reported that they are interested in taking a proactive stance in M&A in response to the pandemic. The aggressive strategy mostly entails executives reconfiguring their businesses to acquire companies that will boost underperforming portfolios and give them a competitive edge. In contrast, 43% of executives want to take a more defensive route, which entails looking to divest underperforming businesses and integrate recently acquired companies to their core businesses. Additionally, in the survey, defensive-minded executives are also looking to partner with other companies to safeguard their core business from another potential economic disruptor like the pandemic.

The uncertainty surrounding the US presidential election engendered a variety of responses from M&A executives. The largest percentage of executives surveyed, 25%, reported that the election slowed down their M&A activity, followed by 23%, for which it quickened the closing of existing deals. Additionally, 18% stated closing deals became more complicated, while another 18% reported that the election had no impact. Lastly, the remainder, 16%, said they had a smooth process in closing M&A deals during the election.

Other key insights in the Deloitte M&A survey included 42% of executives interested in nontraditional M&A and 33% wanting to accelerate their long-term goals. Also, international deal-making has declined, with most executives wishing to concentrate on more domestic deals. Lastly, since M&A activity is currently being done in a virtual setting, cybersecurity is a concern amongst the executives in the survey.

Highest Premiums, Based on Revenue Multiples, in 2020 for Pure-Play Companies				
Price-to-Sales Ratio	Purchaser	Acquired	Purchase Price (M)	Acquired Company's Annual Sales (M)
22.5	Yourgene Health	Coastal Genomics	\$ 14	\$ 0.6
14.2	Sartorius	BIA Separations	\$ 412	\$ 29
7.6	Integument	Modern Waters	\$ 28	\$ 4
6.7	Repligen	ArteSYN Biosolutions	\$ 200	\$ 30
5.1	PerkinElmer	Horizon Discovery	\$ 383	\$ 76
4.9	Sartorius	Various Danaher Businesses	\$ 825	\$ 170

Source: Science and Medicine Group

## Target Markets

In 2020, acquisitions of companies in the areas of bioprocess analysis, cell-based analysis and informatics were top targets of the scientific tool sector. The largest deals for the cell-based instrument market came from 10x Genomics and Bio-Rad Laboratories and were focused on single-cell analysis. 10x Genomics purchased two companies in the spatial analysis space, including its whopping \$350 million acquisition of ReadCoor (see *IBO* 10/15/20), while Bio-Rad with a \$100 million deal for Celsee (see *IBO* 4/15/20). Meanwhile, mentioned above, Horizon Discovery will give PerkinElmer access to cell editing capabilities.

As has been a pattern for a number of years, flow cytometry also attracted suitors. Bruker entered the market by acquiring Canopy Biosciences (see *IBO* 9/15/20), which also signaled the company's deeper overall interest in cell analysis and genomics. Yokogawa Electric's investment in Fluid Imaging Technology (see *IBO* 5/1/20) marked its entry into the market and further growth of its cell analysis franchise. Other flow cytometer deals included Fluidigm's buyout of sample prep instrument firm InstruNor (see *IBO* 3/2/20).

Multiple companies participated in acquisitions to expand their informatics-related businesses, showing how much analytical informatics drives scientific insight across a spectrum of technologies. Illumina secured two software purchases, scooping up BlueBee (see *IBO* 7/2/20) and Enancio (see *IBO* 7/15/20) to create a more integrated ecosystem of sequencing data and genomics analysis for clinical applications. This month, ZEISS acquired a majority of arivis (see Executive Briefing), its first dedicated microscopy software purchase. Lastly, data management solutions provider Dotmatics bulked up instrument data capture capabilities by purchasing BioBright (see *IBO* 7/2/20), furthering lab connectivity. Danaher expanded its data analysis platform for water quality with the purchase of Aquatic Informatics' (see *IBO* 8/5/20), which joined the company's Water Quality Platform Program. Likewise, Brooks Automation added new software resources, purchasing RURO (see *IBO* 2/15/20).

The bioprocessing market was another driver for M&A activity this year with both new and established players taking part. Sartorius was especially active in the bioprocess LC markets, including purchasing various Danaher assets (see *IBO* 5/1/20) to bring it into new markets, such as LC hardware, and BIA Separations (see *IBO* 10/15/20). Sartorius purchases were the largest deals within the overall analytical bioprocessing market, with a combined investment of \$1.2 billion. Repligen continued to build its bioprocess LC franchise, buying single-use provider ARTeSYN Biosolutions (see *IBO* 11/2/20).

Bioreactors were also a hot area, with market newcomer Getinge purchasing well-established player Applikon (see *IBO* 12/31/19). Another newcomer to the bioreactor segment, newly formed and KKR-backed Gamma Biosciences (see *IBO* 3/2/20) made its first bioreactor purchase buying Univercells (see *IBO* 2/29/20), and Beckman Coulter (Danaher) stepped into the market for the first time, though on the lab scale, acquiring m2p-labs (see *IBO* 11/15/20). Analytical instruments dedicated to bioprocess monitoring solutions were also on the radar, with MilliporeSigma's acquisition of RESOLUTION Spectra Systems (see *IBO* 7/15/20), adding Raman technology and a narrow entry into the Raman market.

**Highest-Priced Pure-Play Instrument and Lab Product-Related Acquisitions Announced Dec. 15, 2019–Dec. 15, 2020**

Amount Paid (M)	Purchaser	Acquired	Sales (M)
\$ 1,700	Amphenol	MTS Systems	\$ 893
\$ 1,065	Royal DSM	Erber	\$ 367
\$ 825	Sartorius	Various Danaher Businesses	\$ 170
\$ 412	Sartorius	BIA Separations	\$ 29
\$ 383	PerkinElmer	Horizon Discovery	\$ 76
\$ 350	10x Genomics	ReadCoor	NA

Source: Science and Medicine Group

## Building Businesses

Many companies in 2020 expanded their footprints in technologies and applications where they already have a considerable presence. Gamma Biosciences had an active year in general with its LC firm Astrea Bioseparations scooping up two LC companies, Nanopareil (see *IBO* 10/1/20) for bioprocess applications, and Essential Life Solutions for the lab LC (see *IBO* 9/15/20). As noted above, other bioprocess purchases were executed by Sartorius and Repligen.

Outside of LC, 10x Genomics, as noted above, stepped its presence in spatial cell analysis, while Abcam continue to expand life science reagent offerings (see *IBO* 3/15/20). Consolidation in the centrifuge market was evident in Eppendorf's purchase of Koki Holdings' centrifuge business (see *IBO* 3/31/20). Other examples of market focus by specific companies include Illumina's software buys discussed above, VERDER's purchase of Porotec (see *IBO* 8/31/20), In-Situ's acquisition of Partech (see *IBO* 10/15/20) and JOEL buying Integrated Dynamic Electron Solutions (see *IBO* 1/31/20).

Greatest Number of Pure-Play Acquisitions Publicly Announced Dec. 2019-Dec. 2020	
Company	Number
Bruker	3
Calibre Scientific	3
Gamma Biosciences	3
PerkinElmer*	3
10x Genomics	2
Abcam	2
Ashai Glassplant	2
Danaher	2
Illumina	2
Repligen	2
Sartorius	2

Source: Science and Medicine Group

\*Two of the acquisitions were disclosed in an SEC filing but not the names of the companies

## Diving into New Markets

Several acquisitions marked an introduction to a new market for selected companies. Waters stepped into completely new territory, buying liquid handler firm Andrew Alliance for \$80 million (see *IBO* 1/15/20). Advion expanded into LC, purchasing Interchim (see

*IBO* 2/29/20) as did Sartorius, as noted above. Also aforementioned, Beckman Coulter, Bio-Rad, Bruker, Getinge, MilliporeSigma and Yokogawa Electric were new entrants into different markets. Meanwhile Badger Meter was an entirely new entrant to the analytical instrument market, buying s::can (see *IBO* 11/15/20).

## Divestments

Another form of M&A activity in 2020 was companies' divesting select product lines to concentrate on core businesses. Bio-Rad Laboratories divested its long-held spectroscopy database business to John Wiley & Sons (see *IBO* 4/15/20). Malvern Panalytical exited the rheometry business, selling the product line to NETZSCH (see *IBO* 3/2/20) as part of a larger slimming down plans for parent company Spectris. Another company continuing to shed businesses was Oxford Instruments, which sold its 47% ownership of Scienta Omicron, a surface science technology provider (see *IBO* 1/31/20).

## 2021

In 2021, the pace of deals could accelerate as the world's economy regains stability, depending on successful containment of COVID-19, and larger lab tool firms look to deploy the healthy amounts of cash they hold. It is likely cell analysis continues to attract attention, with companies such as Agilent Technologies, Bruker and PerkinElmer publicly indicating interest in the sector. It could be another big year for bolt-ons by Thermo Fisher, having moved past the QIAGEN bid and in line with past years. Danaher is likely to continue its ongoing M&A activities, having publicly stated it is prioritizing the Life Sciences division for M&A activities. In addition, companies such as Agilent and Waters have disclosed investments in smaller firms that may mature into purchases, as was the case with Waters and Andrew Alliance.



# Agilent, PerkinElmer and QIAGEN Provide a New Look at Their Scientific Tool Businesses

Three major laboratory tool companies held their investor days this month, sharing the strengths of their businesses and detailing areas of increased investment. Agilent Technologies, PerkinElmer and QIAGEN have clearly defined their target end-markets and technologies going forward, maintaining a balance between established footholds and new opportunities. The summaries presented here feature highlights of the presentations and are not complete synopses.

## Agilent Technologies: A Path to Further Growth

Agilent Technologies' investor day highlighted areas of growth for the company, business opportunities and a healthy financial performance. The \$5.3 billion company serves more than 275,000 labs worldwide. Agilent provided a financial outlook of 5%–7% core revenue growth over the next 3–5 years.

Agilent consists of three businesses. The Life Science & Applied Markets Group (LASG), which has an installed base of over 600,000 instruments and serves more than 260,000 labs; Agilent Cross Lab (ACG), which serves a similar number of labs; and the Diagnostics and Genomics Group (DCG), with an installed base of 29,000 systems and customers in 18,000 labs.

From fiscal 2015–20, the company posted a revenue compound annual growth rate (CAGR) of 6% with FY20 sales of \$5.3 billion (see *IBO* 11/1/20). This growth consisted of a 2% CAGR for the core franchise to reach \$600 million, 7% CAGR for CrossLab services and consumables to total \$1.9 billion, and 41% CAGR for the biopharma tools, cell analysis and NASD businesses combined to total \$2.8 billion.

A component of the company's current and future growth is its “build-and-buy” strategy. This strategy encompasses transforming the analytical lab, gaining market share in cancer diagnostics and genomics, and entering and expanding in high-growth markets. Discussing the ongoing transformation of the analytical lab, Agilent President and CEO Mike

McMullen commented, “At the core of our efforts is an integrated platform strategy, where in the lab we will offer intelligent instruments, new customer business models, like subscription services, integrated workflows—all in an integrated digital ecosystem.” This digital lab will operate in new ways. As Jacob Thaysen, LSAG President, put it in his talk, “We envision that the future lab will be a completely digitally connected lab where all instrument solutions are operated from the same informatics platform.”

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*The company’s digital channel is currently responsible for nearly two-thirds of consumables sales.*

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The build-and-buy strategic also fits with the company’s emphasis on expanding customer business models such as more purchasing options, such as technology subscriptions, rentals, leasing and flexible spending plans, and new online features, such as eRenewals and eMethods. The company’s digital channel is currently responsible for nearly two-thirds of consumables sales.

Another avenue for growth prospects is Agilent’s expanding presence in cancer diagnostics and genomics. Commenting on this, Sam Raha, president of the Diagnostics and Genomics Group, noted, “To give you a frame of reference for DGG in terms of revenue, about a half a billion dollars comes from our cancer diagnostics businesses in pathology and companion diagnostics. The other half a billion comes from our DNA and RNA businesses in NASD [Nucleic Acids Solutions Division] and genomics.” Expanding companion diagnostics partnership, and panels for its Dako pathology business are among the drivers of growth in the area of cancer diagnostics for DGG. On the genomics front, new applications utilizing new products such as single-guide RNAs for CRISP-based gene editing will fuel sales opportunities.

High-growth markets for the company encompass biopharma, cell analysis, NASD and COVID-19. As an indicator of its importance, biopharma accounts for 70% of LSAG’s R&D budget. Biopharma opportunities include offerings for cell therapy and online and inline process measurements. In ACG, the company is offering solutions for new biotherapeutic targets as well as workflows with consumables and services, including a new Biomolecular Service Organization addressing biotech and CROs.

Regarding cell analysis. Agilent described a focus on three application areas: immunology, immune-oncology and immunotherapy; infectious disease, virology and vaccine research; and therapeutic development and production. Agilent described NASD as a CDMO for oligo-based therapeutics, with partnerships with over 20 pharmaceutical companies. The company estimates the division could grow to half a billion dollars over five years, as Agilent adds capacity and customer products move from clinical trials to commercialization.

The COVID-19 market is being served by the company's NGS QC, automation, qPCR and cell analysis solutions, which are being utilized for therapeutics, vaccine development and production, and diagnostics, and even for wastewater detection through the company's environmental channels. Offerings specifically for the market include a COVID-19 serology test, the SARS-CoV2 IgG ELSA kit, which will be submitted to the FDA for Emergency Use Authorization this month. Applications for the test could include monitoring immune status.

Throughout the presentation. Agilent emphasized the ability to leverage its installed base, which totals over 600,000 serviceable instruments, and worldwide presence. ACG is in particular driving higher attachment rates and customer lifetime value. Discussing the value of the attachment rate, Padraig McDonnell, president of ACG commented, "Approximately \$30 million [in revenue comes] with every 1% increase in connect rate." The company also stated that it is unique in the scale of its service organization, which can also be a source of sales leads.

Geographically, Agilent emphasized growth opportunity in China. The nation currently accounts for 20% of company revenues, or more than \$1 billion in sales, and 18,000 employees. By segment, China represents 28% of LSAG sales, 18% of ACG sales and 6% of DGG sales. Agilent described itself as underpenetrated in both the ACG and DGG businesses in the country. ACG posted a 15% CAGR in China from fiscal 2015 to fiscal 2017 with revenues of \$347 million, and now has almost 700 employees in Greater China. Growth is coming the digitally enabled services and products including 901services and workflows specifically for the Chinese market. For DGG, recent expansion in the country has included direct importation of diagnostics products, a new opened genomics application of excellence and a reduction in NGS assay delivery time starting next year.

## PerkinElmer: The Life Science Story

Last week, PerkinElmer, a company with 2019 sales of over \$2.8 billion, recently held its first full investor day in many years. The focus was the company's Life Sciences segment of its Discovery & Analytical Solutions business (DAS). DAS will account for 47% of PerkinElmer's estimated 2020 revenues, or \$1.7 billion, with the remainder of sales belonging to the Diagnostics segment. Between 2017 and 2019, DAS posted an average organic growth rate of 5%, with a forecast of continued mid-single digit plus organic growth.

DAS is broken into three subsegments: Life Science, with around \$1.0 billion in revenue; Applied, mostly industrial and environmental, an approximately half a billion dollars business; and Food, with revenues of around \$200 million. Analytical instruments make up about \$500 million of DAS product revenue, mostly in the Applied business. As PerkinElmer Senior Vice President and CFO Jamey Mock commented, "DAS is more consistent and faster growing in a post-COVID world." Future opportunities for DAS overall include grow the key accounts business, bundling of products across the company, and ecommerce, where the company estimates it currently captures less than 10% of DAS' opportunity.

Within DAS, the Life Science (LS) business is a driver. The business consists of Discovery, 40% of the 2020 revenue mix; OneSource Enterprise, with 27% of LS sales; Analytical, with 19%; and Informatics, with 14%. The portfolio is equally divided between small and large molecule solutions, with around 30% of LS sales from early-stage research applications, around 60% from discovery and around 10% from development. Future opportunities include the manufacturing space, where the company already offers analytical systems for QA/QC. For example, the company's new LC 300 system and SimplicityChrom Software will further support applications this year. Describing LS' future. Alan Fletcher, vice president, and General Manager, Discovery, stated, "While our platforms have been used for many years by all leading pharma and biotech companies for small molecule research, we've been working with our customers to expand our applicability in the high-growth areas of biologics and cell therapy." In the area of cellular biology, the company views cell selection, separation QA/QC and delivery as opportunities.

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*Adding Horizon Discovery will bring Research Solutions revenues to 42% of Discovery revenue versus 30% for Detection and 28% for Imaging.*

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Discussing LS' \$400 million Discovery segment, which has over 5,000 customers, the company emphasized its focus on solutions for investigating phenotypes and helping create better disease models. Bolstering the segment will be the acquisition of Horizon Discovery (see *IBO* 11/15/20), which is now expected to close this year rather than first quarter 2021 as originally announced. Adding Horizon Discovery will bring Research Solutions revenues to 42% of Discovery revenue versus 30% for Detection and 28% for Imaging. Additional benefits include Horizon Discovery's presence in the academic market and at pharma accounts. On the technology side for LS as a whole, the purchase will increase genomics tools offerings and add new biomanufacturing opportunities, such as cell line engineering.

The day also provided an overview of DAS' Informatics segment, a \$140 million business serving over 4,000 customers and growing double digits organically. Major product lines include ELNs, and analytics and data processing software serving the life science research and clinical markets and, to a lesser extent, agrochemical, specialty chemical and other industries. The company's Signals platform is built on SAAS, which differentiates it, according Kevin Willoe, Vice President/General Manager, Informatics. "Many of our competitors have decided to try to retrofit on-premise technologies to the cloud. This is causing them scalability and flexibility issues and leaving them with technical baggage that at some point they are going to have to deal with." Highlights of the Informatics business include a 95% renewal rate and a third of orders being for SAAS solutions, which is expected to increase to around 50% by 2022. Future areas of focus include new point product solutions, such as ChemDraw; biologics; formulations and registration; and greater penetration across all of its end-market segments.

DAS' approximately \$700 million OneSource business consists of Core Services, offering service for PerkinElmer products, and Enterprise Services, which provides asset services, representing 70%-80% of total Enterprise revenues, and professional and technical services. A \$270 million business, Enterprise manages over 200,000 assets, only 2% of which are PerkinElmer branded, with over 800 customers. Personnel wise, the business has 1,650 technical experts and 660 dedicated on site personnel. Multiple customer programs manage over 20,000 assets each. As Gary Grecsek, VP/GM, OneSource Enterprise

Laboratory Service, put it, “We’ve developed the technology portfolio that provides transparency across workflows, buildings and global sites, enabling data-driven insights for our customers to improve the performance of the lab.” The segment’s main customer growth is pharma where Enterprise’s business model provides the ability to scale, customer intimacy and access to new accounts.

Although the day was focused on Life Sciences, PerkinElmer also highlighted other business opportunities within DAS. This includes capitalizing on the DAS’ business team of around 1,500 R&D employees and around 5,000 commercial personnel. R&D will enable refresh of analytical instrument platforms and faster product development. In addressing customer experience, the company explained how each customer now has only one point of contact. Part of this effort is growing the Food business. Here, the company plans to expand from grain, dairy and cannabis to end-market segments, such as meat, seafood and poultry, with full workflows and improved commercial channels.

## QIAGEN: Focusing on Strengths

It has been a busy year for QIAGEN, an over \$1.5 billion company supplying molecular biology tools. The company has experienced major demand for consumables and instrumentation for COVID-19 testing. Such revenues are estimated to total \$600 million in 2020. The company was also the subject of a proposed acquisition by Thermo Fisher Scientific, but shareholders rejected the offer this summer (see *IBO* 8/15/20). This month, the company held its first investor day under Thierry Bernard, who was named CEO in March (see *IBO* 3/31/20).

QIAGEN kicked off the day by announcing the raising of its sales and adjusted EPS forecasts for the fourth quarter, full-year 2020 and full-year 2021 (see Executive Briefing), citing better-than-expected results for both COVID-19 and non-COVID-19 associated sales.

At the event, QIAGEN also unveiled a new financial reporting structure divided between: Sample Technologies, PCR/Nucleic Acid Amplification, Diagnostic Solutions, Genomes/NGS and Other. In the first nine months, on a CER basis, sales for each were up 44%, up 54%, down 13%, down 10% and down 10% to \$568 million, \$255 million, \$302 million, \$116 million and \$58 million, respectively.

In its presentation, the company emphasized its new streamlined focus and post COVID-19 growth drivers. Going forward, QIAGEN will invest a greater proportion of resources into these higher-growth opportunities, which the company refers to as its “five pillars of growth”: sample technologies, the QIAcuity digital PCR solution, the QIAstat-Dx solution for syndromic testing, the NeuMoDx integrated PCR platform and its QuantiFERON latent TB testing franchise. Two of the pillars, sample technologies, such as DNA and RNA isolation solutions, and latent TB testing via QuantiFERON, are already established company franchises, whereas the others are relatively new product lines. Underlying the pillars are what the company calls its core businesses: genomics/NGS, precision medicine, PCR/nucleic acid amplification, human ID/forensics, QIAGEN Digital Insights and OEM reagents. For all pillars, excluding sample technologies, revenues are expected to grow double digits at constant exchange rates (CER) post COVID. Mr. Bernard also described other priorities, stating “One, transforming customer service and service activities as a profit center for our company. And, second, having a much stronger monitoring of our installed base management and installed base profitability.”

The company expects COVID-19-related sales to decline next year down from an expected \$600 million this year due to vaccinations. In 2020, sample tech is expected to account for \$400 million of COVID-19 sales. But as Mr. Bernard declared, “What we do not believe is that vaccination kills testing. There are many examples in healthcare proving that a test-and-treat strategy is the right strategy.” He cited flu and HPV as two examples. Going forward, new COVID-19 related testing opportunities for the company include tests for monitoring immunity status with a new QuantFERON assay, and for influenza-like infections with the NeuMoDx platform and assays.

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*Instruments are expected to reach more than \$770–\$780 million in sales this year and more \$750 million next year...*

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For sample technologies, the company promised expanded consumables sales driven by rapid uptake of its instrumentation this year as a result of pandemic-related testing. Instruments are expected to reach more than \$770–\$780 million in sales this year and more \$750 million next year, which includes an expected decrease in manual RNA sample prep sales. A key part of the strategy for sample tech is driving consumables growth as a result of new instrument placements, up by more 3,300 placements this year, including 2,000 new sample prep placements, and new applications, such as microbiome research.

With shipments beginning in October, QIAGEN estimates its QIAcuity business will total \$10 million this year with an installed base of approximately 150 systems. In 2021, sales are estimated to reach around \$45 million and the installed base should reach 600. The product line features three different instruments, with differentiation features, according to the company, such as a plate-based workflow very similar to PCR, a time to result of 2 hours and an entry-level system price of \$30,000 per system. With initial applications in the research market, such as COVID-19 wastewater testing, the company then plans to enter the clinical market, gaining CE-IVD marking for the system in 2023.

Introduced in 2018, the QIAstat Dx real-time PCR platform is expected to hit \$50 million in sales this year, having racked up around 2,000 placements. In 2021, sales are estimated to total around \$120 million. Supporting QIAstat Dx growth in coming years and expanding on its growth in installed base that has resulted from COVID-19 testing, QIAGEN will introduce a number of new panels, including GI panels in the US and a meningitis assay in Europe in 2021. The company will also launch a COVID-19 RUO assay for the platform next year. Priority investments include building out manufacturing capacity to meet unfulfilled consumables demand.

One of QIAGEN's newest products and one accessed through the purchase of NeuMoDx Molecular (see IBO 10/1/20), the PCR-based NeuMoDx launched in late 2018. Sales are expected to be approximately \$50 million this year, rising to around \$140 million next year. In 2020, the installed base will reach an estimated 130 systems. Like NeuMoDx, QIAGEN will expand product sales in coming years with expanded menus and regulatory submissions in both the US and Europe over the next two years. This includes 7 test submission to the US FDA in 2022 and following years.

In the latent TB testing market, QIAGEN sees much growth ahead, estimating only 25% of the overall market for this test has switched from the traditional skin test to blood-based testing, such as that offered by its QuantiFERONn test. The business is expected to record around \$180–\$190 million in sales this year, with sales of approximately \$230 million forecast for 2021. As with NeuMoDx, growth will come from new regulatory approvals for assays, including the launch of QIAreach in the second half of 2021. The QIAreach SARS-Cov-2 virus enables testing in decentralized setting such as airports. Although sales declined in 2020 due to COVID-19, the company expects 2021 sales to equal those of 2019.



Agilent, PerkinElmer and QIAGEN Provide a New Look at Their Scientific Tool Businesses

# Executive Briefing

## QIAGEN, Tecan and Thermo Fisher Raise Sales Forecasts

*Washington, DC 12/1/20; Männedorf, Switzerland 12/1/20; Venlo, the Netherlands 12/8/20*—Three lab instrument tool firms have raised their 2020 revenue forecasts. Thermo Fisher Scientific now expects organic sales to grow 40% in the fourth quarter, up from an initial estimate of 29% (see **IBO** 11/16/20), according to an SEC filing. This would result in 22% organic growth for the year. The company also expects 2020 adjusted EPS to grow 55% to \$19.17, versus an earlier estimate of 48% growth.

Swiss firm Tecan has also raised its full-year sales forecast from growth in the high single digits in local currency (see IBO 9/15/20) to growth in the low to mid-teens. The increase was attributed to strong revenues and COVID-19-related demand. The company also updated its EBITDA margin expectation to 20.5% of sales from the “closer to 20% of sales” estimate made in August. The revisions are also based on currency changes and benefits of scale tied to higher volumes.

QIAGEN also updated its expectations for fourth quarter and provided full-year sales guidance for 2020 and 2021. Fourth quarter sales are estimated to rise a minimum of 32% at constant exchange rates (CER), versus a previous forecast of 24%–27%. Quarterly adjusted EPS is expected to increase to \$0.64–\$0.65, up from the previous forecast of \$0.58–\$0.60 and up from \$0.48 a year ago.

QIAGEN 2020 revenues are forecast to increase approximately 22%, whereas the previous estimate was around 20%. Adjusted EPS is estimated to hit \$2.13–\$2.14 compared to \$1.43 in 2019 and the previous 2020 forecast of \$2.07–\$2.09.

QIAGEN also gave guidance for 2021, estimating a 18%–20% increase in revenues from the 2020 mid-point. Full-year adjusted EPS is expected to be \$2.42–\$2.46. The company attributed financial prospects to its five pillars of growth: sample technologies, QuantFERON for immune response testing, the NeuMoDx PCR system, the QIAstat-Dx syndromic testing solution and the QIAcuity digital PCR solution (see Agilent, PerkinElmer and QIAGEN Provide a New Look at Their Scientific Tool Businesses).

*In October, Thermo Fisher had an estimated \$1.8 billion in COVID-19-associated sales for the fourth quarter, a number that is likely higher now based on this latest news. The company's third quarter sales grew 36%.*

*Indicative of the COVID-19 testing boost for QIAGEN, the company's nine-month revenues for products used in COVID-19 testing totaled \$418 million to make up 32% of company sales.*

*This is the second time this year Tecan has upped its guidance. In March, it forecast sales to rise mid- to high-single digits in local currency and an EBITDA margin of around 19.6%. Tecan's pipette tips are used for COVID-19-related lab testing.*

## MTS Systems Set to Be Acquired

*Wallingford, CT & Eden Prairie, MN 12/9/20—Amphenol has agreed to purchase MTS Systems, a provider of advanced tests systems, motion simulators and precision sensors. Publicly held Amphenol, an interconnect, antenna and sensor solutions company, will pay approximately \$1.7 billion, net of cash, or \$58.50 per share. “This acquisition is consistent with our strategy of continuing to expand our range of sensor and sensor-based products across a wide array of industries to further capitalize on the long-term growth potential of the electronics revolution,” commented Amphenol President and CEO R. Adam Norwitt. MTS Systems' Sensors segment will complement Amphenol's portfolio, and Amphenol will conduct a strategic review of MTS Systems' Test & Simulation business. Amphenol expects MTS Systems to be accretive to EPS in the first year after closing, with \$0.10 attributable to the Sensors segment and \$0.06 attributable to Test & Simulation.*

*In 2019, Amphenol recorded \$8.225 billion in sales. The price per share represents a 52.7% premium to MTS Systems' closing price the day prior to the announcement. The Materials segment of MTS Systems' Test & Simulation segment is the second-largest provider of physical testing systems (as defined by Strategic Directions International (SDI): universal, fatigue, hardness, impact and other testing systems). In fiscal 2020, MTS Systems sales declined 7.2% to \$828.6 million (see Bottom Line), with Materials accounting for 30% of the company's Test & Simulation business, or about \$147 million.*

*The decline in sales was the result of COVID-19-related impacts as the company primarily serves industrial end-markets. Measures taken in response include cost reductions,*

*restructuring and a suspension of dividend payments (see IBO 5/1/20). In May, the company named an interim CEO (see IBO 9/15/20).*

## ZEISS Invests in Imaging Software

*Jena and Munich, Germany, 12/7/20—ZEISS Research Microscopy Solutions, which provides light, electron, x-ray and ion microscope solutions, has acquired a majority stake in arivis. Financial details were not disclosed. The companies were previously partners. Arivis provides microscopy imaging analysis software for life science applications, including 3D imaging and big data solutions. "With this combination of the businesses, we are significantly developing our software competences further in the area of microscopy solutions for research especially when it comes to 3D image processing, visualization and analysis," commented Dr. Michael Albiez, Head of ZEISS Research Microscopy Solutions. "Modern microscope systems with high-resolution optics are recording ever increasing amounts of data, and advanced software solutions help researchers to effectively analyze their data in a streamlined way, increasing their efficiency in research." All of arivis' imaging solutions employees will remain with the company.*

*The companies have been partners since 2014. According to Dun & Bradstreet, arivis' annual revenues topping \$13 million. Its informatics solutions are used with super-resolution microscopy, among other microscopy techniques, in applications such as cellular imaging and analysis.*

## Sartorius Adds to Filtration Business

*Göttingen, Germany 12/9/20—Sartorius has purchased cross flow filtration firm WaterSep BioSeparations for \$27 million and an earn-out worth up to \$9 million. With 2020 revenues of \$2.5 million, WaterSep BioSeparations provides hollow-fiber membrane devices and pre-sterilized assemblies for bioprocessing. Based in the US, the company has 15 employees and a double-digit EBITDA margin. "This acquisition nicely complements our current offering for cell and gene therapy applications, cell harvesting and various solutions for intensified bioprocessing," said Dr. René Fáber, Head of the Sartorius Bioprocess Solutions Division and Executive Board member.*

*WaterSep's product line includes single-use and reusable filtration cartridges. Sartorius is well-established in crossflow filtration (tangential flow filtration) using membranes, including hollow fiber, for both lab- and industrial-scale applications.*

## Certara Completes IPO

*Princeton, NJ 12/3/20; Princeton, NJ 12/11/20*—Biosimulation software firm Certara has gone public on the Nasdaq market (see **IBO** 12/1/20) at a price per share of \$23, with expected gross proceeds of \$336.5 million before expenses and underwriting discounts and commissions. Earlier in the month, the company had priced the offering at \$19–\$22 per share.

*Reuters reported that Certara upsized the number of shares offered by 19%, resulting in \$670 million raised. The stock closed on December 14 at \$33.59 per share.*

## Seer Share Price Skyrockets

*Washington, DC 11/30/20; Redwood City, CA 12/3/20; Washington, DC 12/4/20; Redwood City, CA 12/8/20* —Proteomics technology provider Seer went public (see **IBO** 11/15/20) on December 4 at a price per share of \$19. Gross proceeds totaled \$201.3 million before deducting underwriting discounts and commissions and other offering expenses and with underwriters having exercised their option to purchase shares. The company had previously announced a price per share of \$16–\$18. The offering closed December 8.

*The upsized offering debuted at \$48 per share and closed at \$66.29 per share on December 14. As of September 30, Seer had 60 employees.*

## 908 Devices Sets IPO Terms

*Boston, MA 12/14/20*—908 Devices, which provides purpose-build handheld MS systems for chemical and biomolecular analysis, has announced that it plans to offer 6,250,000 shares at price of \$15–\$17 per share in its IPO (see **IBO** 12/1/20). The stock will trade on the Nasdaq Global Market under “MASS.” Net proceeds will be used to grow commercial

operations and fund R&D and may be also used for acquisitions. The company has commenced its roadshow.

*An offering of \$16 per share is estimated to net \$90.3 million, or \$104.3 million if the underwriters exercise their option in full. The company wrote in its latest SEC filing: “Without giving effect to the net proceeds from this offering, we expect that our existing cash as of December 31, 2019 will be sufficient to fund our operating expenses, capital expenditure requirements and debt service payments into the third quarter of 2021.”*

## Calibre Scientific Expands in North America

*Los Angeles, CA 12/14/20*—Calibre Scientific, which provides life science reagents, tools, instruments, and other consumables to the lab research, diagnostics, industrial, and biopharmaceutical communities, has acquired Canadian Life Science (CLS) for an undisclosed amount. The North American distribution to be purchased by Calibre Scientific, CLS distributes a range of consumables products, specializing in chromatography products. CLS is a Calibre Scientific distributor. “The regional and technical expertise of Canadian Life Science will enable Calibre Scientific to expand our pan-European distribution network into North America, creating exciting opportunities for co-sales as we increase the scope of our customer interactions through the breadth and depth of the product offering we can bring into the region,” said Mike Brownleader, Calibre Scientific’s Chief Revenue Officer.

*This is Calibre Scientific’s fourth acquisition this year, including the October purchase of a European distributor (see **IBO** 11/1/20). In June, Calibre Scientific received a \$92 million multicurrency first lien credit facility from CVC Credit Partners to support future growth (see **IBO** 7/15/20). Calibre Scientific is owned by private equity firm StoneCalibre.*

# Third Quarter Results: Biotage, Bio-Techne, HORIBA and Shimadzu

## Biotage Reports Strong Sales in China and the Europe & EMEA Region

### Biotage by Product Line Q3 FY20

	Rev. (M)	Chg.
<b>Total Company</b>	SEK 262.6	-7.1%
Systems	SEK 237.3	-7.7%
Service Contracts and Other Services	SEK 23.6	0.1%
Other Sales Revenue	SEK 1.7	-18.1%

Biotage concluded the third quarter with revenues declining in the high single digits. Organic sales fell 7.1% to SEK 262.6 million (\$29.6 million at SEK 8.87 = \$1) (see *IBO* 9/1/20). On a reported basis, systems and aftermarket product sales accounted for 51% and 49% of revenues, respectively.

### Biotage Operating Profit Q3 FY20

Op. Profit (M)	Chg.	Op. Margin	Chg. (bps)
SEK 60.7	-5.6%	23.1%	37

Despite reported and organic sales declines for the third quarter, Biotage experienced a 3.3% rise in sales sequentially. The company attributed its third quarter financial performance to cost control and its products meeting demand in COVID-19 vaccine and therapeutic development. However, Biotage still weathered COVID-19-related headwinds, such as business disruptions stemming from global lockdown measures. Additionally, Biotage saw stable demand in the precision medicine market and for non-COVID-19-related product lines.

<b>Biotage by Region Q3 FY20</b>			
	<b>Rev. (M)</b>	<b>Chg.</b>	<b>% of Rev.</b>
Americas	SEK 111.8	-12.9%	43%
Europe & EMEA	SEK 69.6	5.9%	26%
Asia	SEK 81.2	-8.3%	31%

On a geographical basis, Biotage reported significant sales growth in Europe & EMEA and specific regions within Asia, especially China. Indeed, the greatest revenue growth for the company came from China. However, China's strong performance could not offset tepid sales in India and Japan due to both regions experiencing business disruptions because of COVID-19.

Europe & EMEA was the only region besides China to report sales growth for Biotage thanks to end-users resuming activities in the area. However, the company noted that sales recovery in Europe & EMEA was proceeding at a slow pace.

<b>Biotage by Division Q3 FY20</b>		
	<b>Rev. (M)</b>	<b>Chg.</b>
Organic Chemistry	SEK 141.8	7.1%
Analytical Chemistry	SEK 86.2	-8.4%
Scale-Up (formerly Industrial Products)	SEK 25.5	-46.3%
Biomolecules	SEK 9.1	4.5%

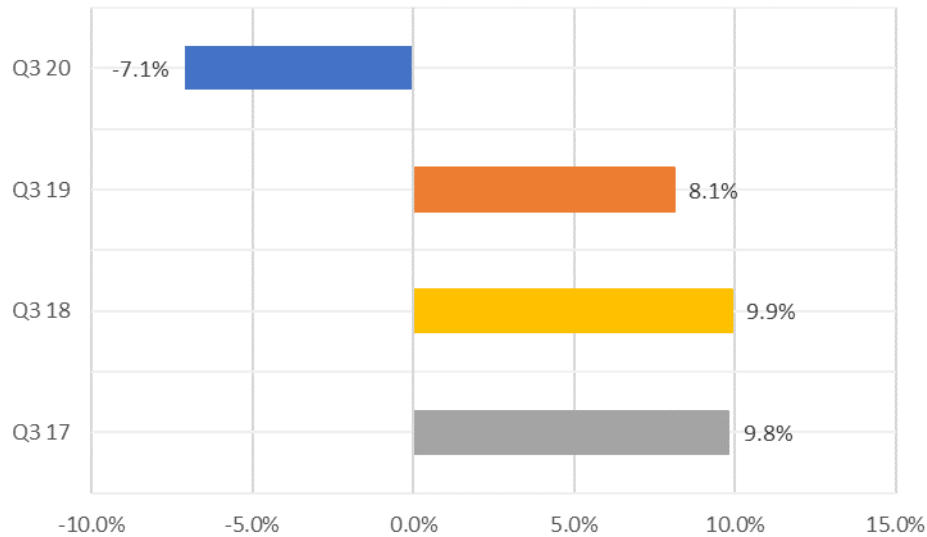
By division, the Organic Chemistry business performed the best due to robust sales for its instrument portfolio in China. In contrast, Biotage's Scale-Up division was the worst performer due to tepid demand from the cannabis market, especially in the Americas.



<b>Biotage by Sales Q3 FY20</b>			
	<b>Rev. (M)</b>	<b>Chg.</b>	<b>% of Rev.</b>
Direct Sales	SEK 245.3	-8.9%	93.4%
Distributors	SEK 17.2	28.5%	6.6%

Biotage did not provide revenue guidance for the fourth quarter or full year. However, the company provided commentary for the remainder of 2020, stating it was in good financial standings to weather any external challenges yet still considered pandemic-related challenges. For example, the company anticipates a longer wait in receiving payment from customers whose own financial position could be impacted by the pandemic. Lastly, Biotage reaffirmed its forecast of an average annual organic sales growth goal of 8% over three years (see *IBO* 9/11/20).

### Biotage Q3 FY20 Sales Change. Comparison



### Bio-Techne Starts Fiscal 2021 with Strong Sales Growth

#### Bio-Techne by Division Q1 FY21

	Rev. (M)	Chg.	Acq./Div.	Currency	Organic Chg.	% of Rev.
<b>Total</b>	\$204.2	11.4%	0%	1%	10%	
Protein Sciences	\$154.4	9.5%	0%	2%	8%	76%
Diagnostics and Genomics	\$50.1	17.8%	0%	1%	17%	25%
Intersegment	-\$0.4	22.4%	—	—	—	—

Bio-Techne's fiscal first quarter revenue performance (see *IBO* 8/17/20) reached pre-pandemic levels, posting double-digit growth on both a reported and organic basis. The company's organic sales performance exceeded expectations, which was initially a flat organic sales rate forecast. Bio-Techne attributed its financial performance to laboratory customers reopening worksites and resuming paused projects due to COVID-19 lockdown measures. The company's revenue was driven by an increase in demand from both the biopharmaceutical and academic end-markets after a tepid response in the fiscal fourth

quarter. Lastly, Bio-Techne's COVID-19-related research product sales contributed three-percentage points to total revenues.

<b>Bio-Techne Operating Margin by Division Q1 FY21</b>		
	<b>Adj. Op. Margin</b>	<b>Chg. (bps)</b>
<b>Total</b>	38.7%	576
Protein Sciences	45.6%	332
Diagnostics and Genomics	17.5%	1537

Protein Sciences business revenues were driven by strong sales of its Simple Western and Simple Plex products, posting about 35% and 75% growth, respectively. Additionally, Protein Sciences' reagents portfolio sales improved sequentially but posted a flat sales rate on a year-over-year basis. End-market wise, reagents portfolio sales were robust in the biopharmaceutical end-market yet were moderate in the academic laboratory sector due to the slow reopening of laboratories.

The Diagnostics and Genomics division was also a strong performer, posting double-digit organic and reported sales growth. Genomics segment revenue grew approximately 30% thanks to robust sales in the RNA Scope product line and 60% revenue growth in the pharmaceutical assays service business. Within the Diagnostics division, the Exosome Diagnostics portfolio experienced a 125% sales uptick thanks in part to a surge in volume of ExoDx testing, which was close to pre-COVID-19 pandemic levels.

<b>Bio-Techne by Region Q1 FY21</b>			
	<b>Rev.</b>	<b>Chg.</b>	<b>% of Rev.</b>
US	\$113.6	11.0%	56%
EMEA, excl. UK	\$43.1	11.2%	21%
UK	\$8.5	12.5%	4%
APAC, excl. Greater China	\$15.7	12.3%	8%
Greater China	\$18.1	12.3%	9%
Rest of World	\$5.2	17.5%	3%

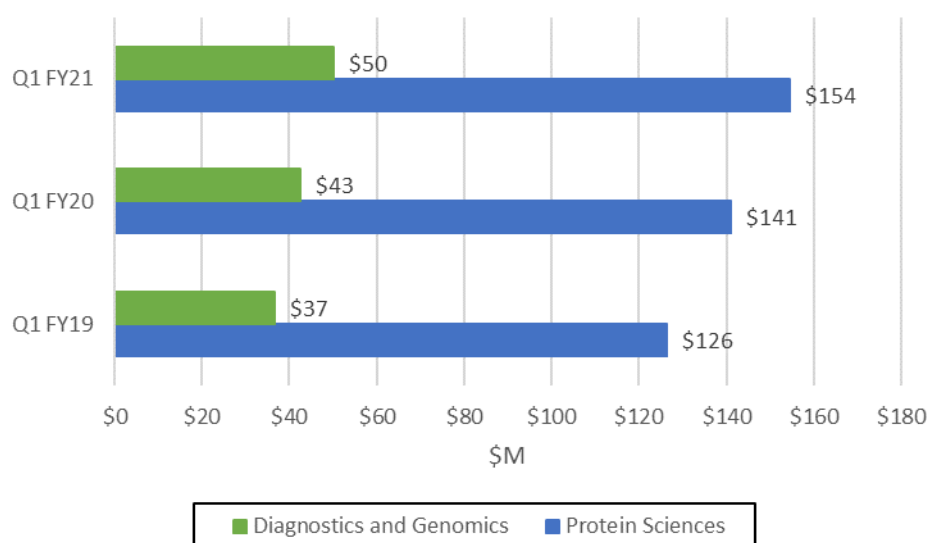
On a geographical basis, the US and Europe posted approximately 10% organic revenue growth because of stable demand from both the biopharmaceutical and academic end-markets. Specifically, both regions grew revenues in the high-teens in the biopharmaceutical end-market while also seeing a sales recovery in the academic sector resulting in mid-single-digit revenue growth.

Sales in China grew in the high teens despite an uptick in coronavirus infection rates at the beginning of the quarter. Specifically, early in the quarter, Chinese sales suffered from laboratories closing due to social distancing restrictions.

Lastly, Asia's revenues increased in the high single digits, with most countries posting significant sales growth. However, pandemic-related shutdowns in India and Australia partially impacted sales for the region.

Bio-Techne did not provide a forecast for the fiscal second quarter but did for fiscal 2021. The company predicted that annual sales would experience a double-digit revenue increase and expect this sales rate to continue in subsequent years.

### Bio-Techne Q1 FY21 Sales Comparison by Divisions



### HORIBA Posts Sequential Sales Growth

In the first nine months of 2020, the COVID-19 pandemic continued to disrupt HORIBA's business operations for its Scientific Instruments & Systems (SI) and Process & Environmental Instruments and Systems (P&E) divisions. Despite these challenges, the company's combined sales for SI and P&E rose 2.3% in the third quarter to ¥11,090 million (\$104.5 million at ¥106.16 = \$1) and made up 24% of the total company sales (see *IBO* 10/15/20). Please note the charts' financial information is on a quarterly basis sourced from both HORIBA and *IBO's* calculations. Additionally, the information below stems from both HORIBA's third quarter and nine-month financial data.

#### HORIBA by Division Q3 FY20

	Rev. (M)	Chg.	% of Rev.
Process & Environmental Instruments & Systems	¥4,125	-12.4%	9%
Scientific Instruments & Systems	¥6,965	13.6%	15%

P&E's nine-month sales benefitted from public utility end-users' continuing projects, yet the business saw a slow investment rate from these customers in that same period. As a result, P&E's nine-month revenues fell 7.7% to ¥12,799 million (\$120.6 million). P&E quarterly operating income decreased 21.8% to ¥323 million (\$3.0 million), while its nine-month operating income fell 21.8% to ¥763 million (\$7.2 million).

Thanks to a sequential increase in quarterly revenue, P&E raised its fourth quarter and annual revenue forecasts. For the fourth quarter, the business anticipates sales of ¥5,200 million (\$49.0 million), which would result in a 7.6% decline. For its annual guidance, P&E expects revenues to increase from ¥17,500 million (\$164.8 million) to ¥18,000 million (\$169.6 million), leading to a 7.7% decrease (see *IBO* 10/15/20). Additionally, the division reaffirmed the continuation of low oil industry demand due to customers' poor capital investment in equipment and falling global oil prices (see *IBO* 10/15/20).

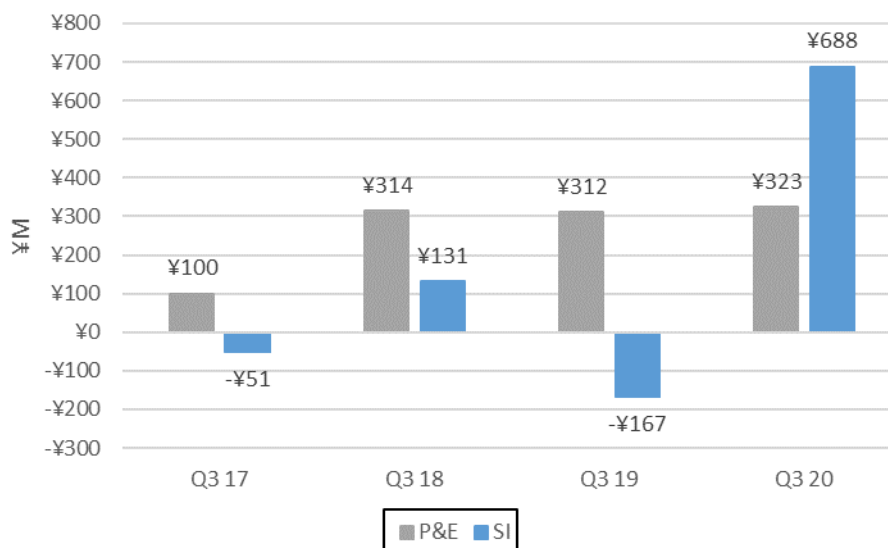
#### HORIBA by Region Q3 FY20

	SI		PE	
	Rev. (M)	Chg.	Rev. (M)	Chg.
Japan	¥1,202	-22.3%	¥2,143	-13.1%
Asia	¥2,124	29.0%	¥921	-1.2%
Americas	¥2,132	18.1%	¥548	-17.5%
Europe	¥1,507	32.9%	¥514	-20.7%

SI's quarterly revenue experienced a double-digit increase and posted an operating gain of ¥688 million (\$6.5 million), which was an improvement from the operating loss of ¥167 million (\$1.6 million). In contrast, SI's first nine-month revenue performance decreased by 2.6% to ¥18,332 (\$172.7 million). The business attributed its sales performance to slow R&D activity in various industries, offsetting strong sales of its semiconductor-related measurement products, and high market demand from the pharmaceutical and life science sectors. Additionally, SI posted a nine-month operating income increase of ¥852 million (\$8.0 million), which was an improvement from the operating loss of ¥257 million (\$2.4 million). SI credited this operating income performance to a reduction in selling expenses.

Like P&E, SI's third quarter sales improved sequentially, yet the business reaffirmed its full-year 2020 revenue forecast of ¥26,500 million (\$249.6 million), which would be a 2.5% decrease (see *IBO* 10/15/20). Additionally, SI predicts fourth quarter sales to be ¥8,167 million (\$76.9 million), which would result in a 2.1% decline.

#### HORIBA Q3 FY20 Operating Profit Comparison of Process & Environmental and Scientific Instruments (SI)



## Shimadzu Sees Slow Recovery in Academic and Government Markets

Shimadzu Analytical & Measuring Instrument's (AMI) fiscal second quarter revenues declined 2.6% to ¥62.1 billion (\$585 billion at ¥106.16 = \$1), with local currency growth of 4.0%. Sales accounted for 63% of total company revenues (see *IBO* 11/16/20). Please note that the charts' financial information is on a quarterly basis sourced from both Shimadzu and *IBO's* calculations. In contrast, the information in the articles stems from Shimadzu AMI's fiscal first-half 2021 financial data.

**Shimadzu AMI by Product Line Q2 FY21**

	Rev. (B)	% Chg.	Local Currency Chg.
<b>Total</b>	¥62.1	-2.6%	-4.0%
Key Models	¥34.8	5.2%	2.0%
Other	¥27.3	-11.0%	-

For the fiscal second quarter and the first half of 2021, Shimadzu AMI reported a low single-digit revenue decrease. Sales of COVID-19-related PCR diagnostic kits totaled ¥1.1 billion (\$10.4 million) in the fiscal first-half of 2021. But Shimadzu AMI sales suffered from closures of automotive and academic worksites due to the COVID-19 pandemic.

**Shimadzu AMI Operating Margin Q2 FY21**

Op. Profit	Chg.	Local Currency Chg.	Op. Margin	Chg. (bps)
¥11.8	10.0%	7.0%	19.0%	218

By end-market, fiscal first-half 2021 sales to the three main sectors were mixed. The pharmaceutical/contract analysis/healthcare/food market was the only one that was positive thanks to strong global demand from pharmaceutical and healthcare end-users. Within the pharmaceutical, public health and healthcare sectors, Shimadzu AMI saw significant sales growth for its Key Model and Other Models' portfolios. Regarding the Key Model line, sales of its LC, MS and GC products in the pharmaceutical, healthcare and public health fields were strong, respectively. Other Models sales benefitted from demand from the COVID-19-related marketplace, especially Shimadzu AMI's COVID-19-related PCR diagnostic kits. However, overall Other Models revenue declined for both the fiscal second quarter and first-half 2021 because of a slow recovery of transport equipment and other industrial fields customers resuming capital equipment investment.



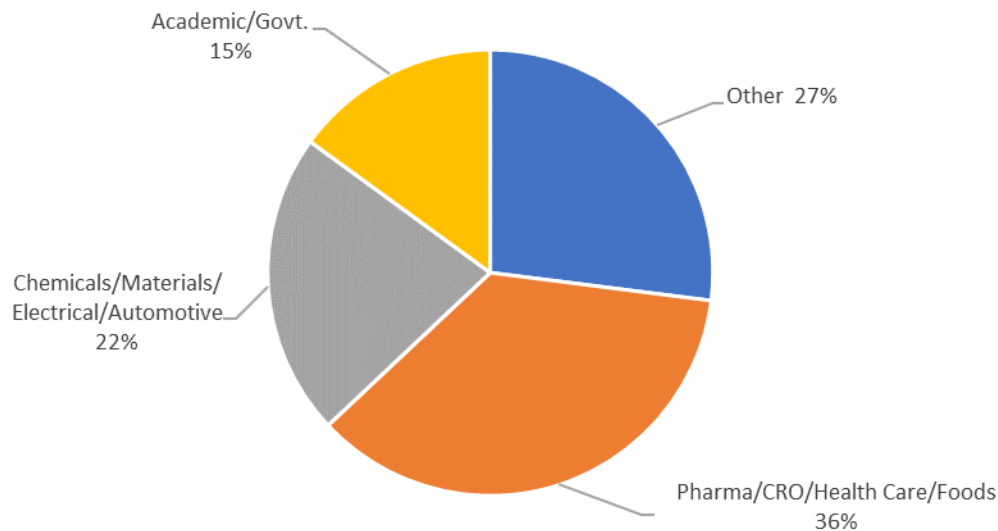
On a geographical basis, chemicals/materials/electrical/automotive sales continued to recover in China yet decreased in other regions. Additionally, demand was low from the automotive industry.

The closing of academic institutions and governments suspended bidding for projects, negatively impacting AMI sales to this sector. Though government-related sales performed poorly overall, Shimadzu AMI observed pockets of growth resulting from some government-users resuming funding and bidding.

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#### Shimadzu AMI H1 FY21 End-Market Sales Breakdown

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Note: The graph reflects Shimadzu AMI's H1 FY21 end-market sales.

In Japan, sales finished down due to waning demand for Shimadzu AMI's testing machines, nondestructive inspection machines, and other products in the country's transport equipment, chemical and electrical industries. Additionally, fiscal first-half 2021 revenues faced a tough comparison due to a sales uptick from last year, which occurred because end-users wanted to buy equipment before Japan increased its consumption tax.

Shimadzu AMI sales in China saw strength due to demand for LC and MS systems from the pharmaceutical and food safety industries. LC and MS system sales were also robust due to the country's investment in fighting the pandemic and preparing to release the 2020 Chinese Pharmacopoeia.

In Other Asian Countries, overall sales tumbled yet improved on a sequential basis. Sales began to recover after facing challenges stemming from pandemic-related lockdown measures. In India, sales for Shimadzu AMI's LC and MS products improved as the country's pharmaceutical industry resumed domestic drug manufacturing after a slowdown of China imports.

North American sales improved sequentially after a high single-digit decline in the fiscal first quarter, resulting from social distancing restrictions (see *IBO* 9/15/20). For the fiscal first-half of 2021, regional sales grew thanks to healthcare institutions purchasing MALDI-MS systems to detect and identify microorganisms inside hospitals.

Within Europe, LC and MS systems' demand rose as Russia's food safety market began to export agricultural and food products to other European countries. In contrast, academic market sales in Europe tumbled because of the temporary closures of universities.

#### Shimadzu AMI by Region Q2 FY21

	Chg.	Local Currency Chg.	% of Rev.
Japan	-13.1%	-15.0%	40%
Americas	6.8%	-	12%
North America	10.8%	13.0%	-
South America	-22.4%	-	-
Europe	-3.4%	-5.0%	10%
China	15.3%	14.0%	23%
Other Asia	-1.2%	-9.0%	11%
India	15.9%	-4.0%	-
Other	0.4%	-	2%

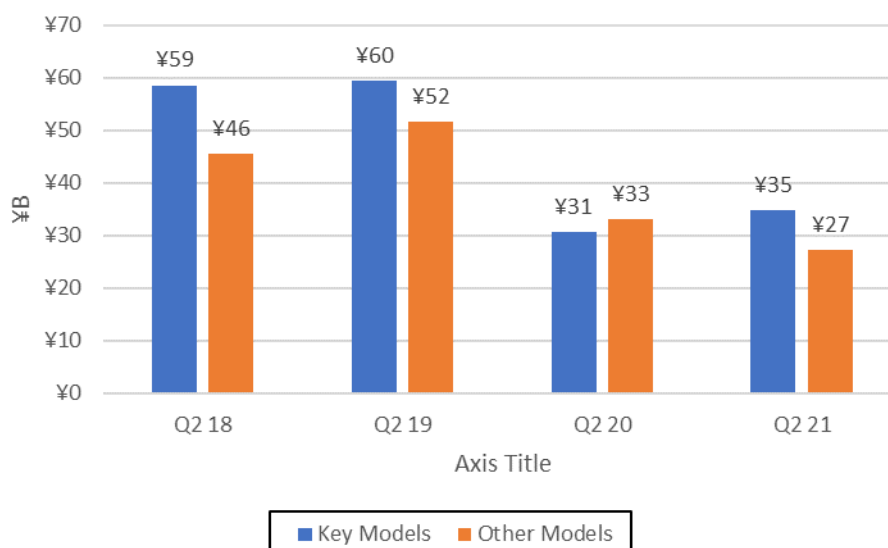
Shimadzu AMI forecasts the fiscal year 2021 sales decline 8.2% to ¥228.0 billion (\$2.1 billion), with local currency growth falling about 3%. On a geographical basis, throughout the year, revenues are predicted to recover in China, while other regions may face pandemic-related challenges.

For the latter half of fiscal 2021, Shimadzu AMI forecasts the pandemic will continue to impact its overall business on both a geographical and end-market basis yet expects pockets of sales growth in specific sectors. For example, the company believes the chemicals/materials/electrical/automotive market will face the most challenges due to decreased capital investments and other factors affecting the automotive, steel and chemical materials and machinery industries.

Thanks to the reopening of academic worksites and governments resuming bidding for projects, the academia/government end-market is expected to fare better. Additionally, because of the pandemic, the company anticipates demand in the government market to increase as countries initiate R&D projects to counter future pandemics.

Lastly, Shimadzu AMI expects pharmaceuticals/contract analysis/healthcare/food sector sales to grow in the latter half of fiscal 2021. For instance, the company sees high demand for its COVID-19-related PCR detection kits outside of Japan. Additionally, in China, the company forecasts sales will increase due to the 2020 Chinese Pharmacopoeia release. Lastly, Shimadzu AMI predicts robust demand in the overall pharmaceutical and virus research markets.

#### Shimadzu AMI Q2 FY21 Sales Comparison of Key Models and Other Models



\*Correction: **IBO** miscalculated Shimadzu AMI's South American Q1 FY21 revenue in the quarterly write-up (see **IBO** 9/15/20). The country's quarterly sales tumbled 55.6%, not 95.6%, as previously reported. Please refer to the table below, showing the correction.

<b>Shimadzu AMI by Region Q1 FY21</b>			
	<b>Chg.</b>	<b>Local Currency Chg.</b>	<b>% of Rev.</b>
Japan	1.0%	-11.0%	36%
Americas	-14.2%	-	12%
North America	-6.8%	-4.0%	-
South America	-55.6%	-	-
Europe	-9.1%	-5.0%	10%
China	9.8%	12.0%	29%
Other Asia	-23.6%	-25.0%	11%
India	-29.9%	-35.0%	-
Other	-26.2%	-	2%

Third Quarter Results: Biotage, Bio-Techne, HORIBA and Shimadzu

# Market Profile: Mixed-mode Chromatography

Chromatography consists of separation techniques based on molecular differences such as size, charge, polarity, solubility, affinity, etc. In chromatography, there is a mobile phase and a stationary phase within a column. The mobile phase typically consists of a mixed solution containing the target analyte to be isolated and purified or detected. The stationary phase consists of resin, which is designed to separate the molecules by retaining them for different periods of time. Resins, also referred to as separations media, exist in a wide variety of types, volumes and grades. There are many different ways for the stationary phase to retain analytes inside the column, including reverse phase, normal phase, ion exchange, size exclusion chromatography, affinity, etc.

Mixed-mode chromatography involves the usage of more than one separation mode. The most popular combination is reverse phase and ion exchange methods. In reverse phase, a polar mobile phase and a non-polar stationary phase are used for column separations. Meanwhile, ion exchange separations utilize ionic attraction and repulsion between charged species. The combination of these methods allows the separation of both polar and non-polar analytes in a single column.

The biggest advantage of this method is that users can fine-tune separation selectivity by adjusting several conditions such as mobile phase ionic charge, pH and organic/non-organic solvents. The mixed-mode approach has been evolving from mixed packed beads to single ligands, which yields homogeneous and reproducible results. The zwitterionic ligand is the next generation of mixed-mode separation and includes both anionic and cationic functional groups in each ligand. The mixed-mode technique is commonly used in the pharmaceutical and biotechnology sector to analyze and purify biomolecules. Companies in this end-market mainly drive demand for mixed-mode chromatography resins, but other industries that focus on the production and purification of biomolecules, such as CROs, are involved in the market as well.

The largest market by application for mixed-mode chromatography is in mAbs analysis and purification. In this application, mixed-mode resins are most commonly used to remove

host cell proteins, antibody aggregates and excess proteins. Aside from mAbs, mixed-mode separation is also used to purify recombinant proteins, viruses, enzymes, biosimilars and vaccines.

The overall mixed-mode chromatography market, which includes prepacked columns and resins, reached more than \$100 million in 2019. Growth in 2020 is projected to be almost flat as the pandemic has significantly diminished general chromatography demand due to lab closures. On the bright side, COVID-19-related research also buoys mixed-mode chromatography demand, particularly for virus and vaccine applications. In the long run, the mixed-mode market will restore its robust growth in 2021 and 2022, driven by pent-up demand and increasing biotherapeutic interest.

The market has a strong base in North America and Europe, supported by significant demand from advanced research labs and biotech giants established in these regions. However, emerging markets such as China and India will lead regional growth, driven by substantial investment in the biotech and biopharma industries in these countries.

In terms of vendor share, Cytiva, formerly known as GE Healthcare before Danaher's acquisition (see *IBO* 2/28/19), is the leading supplier in the market. The company has a diverse portfolio of mixed-mode resins that cover all of the aforementioned applications. Cytiva also has one of the largest total portfolios of resins designed for vaccine development. Meanwhile, MilliporeSigma has a narrower range of resins, which are targeted primarily towards antibodies and proteins. On the column side, Thermo Fisher Scientific and Waters are the leaders in supplying mixed-mode HPLC columns.

## Leading Vendors

- Cytiva (Danaher)
- MilliporeSigma
- Bio-Rad Laboratories

## Largest Markets

- Biotechnology

- Pharmaceutical
- CROs

### Column Cost

- \$630–\$1,300

### Resin Cost

- \$1,000–\$8,500/L



# Industry Watch

## Biopharmaceutical

Attention is widely focused on COVID-19 vaccine manufacturing and supply chains. The upswing in demand is expected to generate bottlenecks in areas such as filling and distribution. Other supply chains concerns include ultra-low temperature transport and storage, glass-vial shortages, and insufficient amounts of carbon dioxide to make dry ice. As for production, Adrian La Porta of Bryden Wood believes that global supply of vaccines may be delayed by lack of available personnel worldwide with the necessary expertise.

Pfizer manufactures its COVID-19 vaccine internally, with three separate US manufacturing sites focused on raw materials, mRNA drug substance production, and formulation, fill and finish. Outside the US, in Germany, BioNTech, Pfizer's partner, is manufacturing raw materials, with German contract manufacturing Rentschler providing purification and Pfizer's own site in Belgium performing formulation and vial filling. Additional European suppliers in Germany and Austria are providing lipids and excipients.

Moderna is utilizing contract manufacturers for its vaccine production, including Lonza facilities in the US and Switzerland, using a three-step process. CordenPharma is supplying lipids, drawing on facilities in France, Switzerland and the US. US-based Catalant and Spain-based ROVI are supplying fill and finish services.

Although AstraZeneca has not disclosed its manufacturing suppliers or partners, it has noted that it's using multiple supply chains and facilities encompassing over 20 partners across 15 countries.

As more is learned about the vaccine, it is likely that production volumes and processes will be further finetuned and greater efficiencies will take hold. Yet such changes may threaten the vaccine's regulatory status. But if a regular supply of vaccines is necessary, such as annual vaccination, greater efficiencies could be necessary.

**Source:** *The Chemical Engineer* (December 10)

## Chemicals

Excluding pharmaceuticals, US chemical production is expected to bounce back next year following an estimated 3.6% decline in 2020, according to the American Chemistry Council's (ACC's) "Year-end 2020 Chemical Industry Situation and Outlook." In 2021, production should rise 3.9% with a 2.7% rise forecast for 2022. Production in all chemical segments fell this year, except plastic resins due to COVID-19-related demand.

Among the declines was production basic chemicals, which dropped 1.3% with all segments showing declines. However, in 2021 and 2022, basic chemicals production is expected to grow 5.0% and 3.2%, respectively, as the economy recovers and industrial production, such as automotive manufacturing and building and construction, returns to growth. In 2020 US industrial production fell 6.9% but should rise 3.7% next year and 3.5% in 2022.

US chemicals trade declined 7% in 2020 to \$220.8 billion, with exports down 9% to \$124.0 billion and imports down 5% to \$96.8 billion. However, in 2021, they should recover to \$134.5 billion and 105.5 billion, respectively.

**Source:** ACC (December 9)

## Food

Amazon has announced that it will begin requiring vitamin and supplement manufacturers test their products sold on its site that have no nutrition fact panel. Companies must provide a Certificate of Analysis (COA). Among the requirements are labels reflecting the actual potency and amount of active ingredient and that the products are produced using GMP.

Supplement maker NOW, which documents its product testing result, has publicized its potency test results of other companies' supplement products bought on Amazon. The findings showed the amounts of the active ingredient did not meet label claims in most cases. Although Dan Richard, vice president of sales at NOW, is glad about Amazon's new policy, he observes that COAs can still be manipulated and that Amazon personnel may not have to the expertise to properly analyze them.

**Source:** *nutraingredients-usa.com* (December 4)

## Region Watch

### UK

The UK's licensed gene and cell therapy manufacturing capacity continues to grow. A survey conducted by the Cell and Gene Therapy Catapult in October and November encompassed 25 out of 26 facilities (see table). Of these, 11 are commercially owned with the remainder in the academic and the public sector.

In total, manufacturing footprint (cleanroom space) increased 47.5% between November 2019 and November 2020 to reach 126,541 ft<sup>2</sup> (11,756 m<sup>2</sup>) with a total of 159 cleanrooms. In-house QC space rose 9.9% to 98,834 ft<sup>2</sup> (9,182 m<sup>2</sup>). New or expanded space was added by Oxford BioMedica, Cobra Biologics, and the Cell and Gene Therapy Catapult. During the coming 12 months, 700 m<sup>2</sup> of additional space should be licensed.

Average booking capacity was 86% for the period, up 14%. Full-time staffing for manufacturing, test and release rose 15.0% to 1,310.

**UK Gene and Cell Therapy Manufacturing Space, 2020**

	# of Facilities	Number of Cleanrooms	Total Cleanroom Space (m <sup>2</sup> )	Chg. in Cleanroom Space	In-hose QC Space (m <sup>2</sup> )	Full-time Employees	Avg. Booked Capacity
Cell Therapy	11	56	1,517	8.0%	483	154	86%
Gene Therapy	8	57	6,694	72.1%	7,849	603	95%
Multifunctional	7	NA	3,545	32.5%	850	553	75%

Source: Cell and Gene Therapy Catapult

The top capabilities at UK gene therapy manufacturing sites, out of 8 categories of processes provided, were suspension and adherence (9 sites each), and lentivirus and AAV (8 each).

Among both cell therapy and multifunctional sites, the greater number of sites, out of 8 process categories provided, were allogenic and/or autologous processes (15 sites each), followed by tissue-specific stem cells (14) and immune cells (14).

**Source:** *Cell and Gene Therapy Catapult* (December 1)

## Spain

Spain has announced record growth for its R&D budget. The 2021 budget for the Ministry of Science and Innovation will increase 59.4% to €3,232 million (\$3,784 million), including double-digit increases for several government R&D agencies (see table). The funding includes €62 million (\$73 million) for training and hiring, including creation of tenure track positions. New funding for the State Research Agency (AEI) will promote private-public collaboration. The budget for the Center for the Development of Industrial Technology (CDTI) includes €271 million (\$317 million) for investments in businesses providing strategic technologies and €30 million (\$35 million) to support small- and medium-sized companies.

**2021 vs. 2020 Budgets for Selected Spanish R&D Agencies**

	Change	Euros (M)	US Dollars (M)
Center for the Development of Industrial Technology (CDTI)	-0.5%	€ 1,504.9	\$1,770.47
Higher Council for Scientific Research (CSIC)	43.8%	€ 906.2	\$1,066.12
State Research Agency (AEI)	29.0%	€ 825.7	\$971.41
Carlos III Health Institute (ISCIII)	48.4%	€ 402.7	\$473.76
Center for Energy, Environmental and Technological Research (CIEMAT)	44.8%	€ 128.3	\$150.94
National Institute for Agricultural and Food Research and Technology (INIA)	43.6%	€ 75.4	\$88.71

Source: ciencia.gob.es

Specific budgetary items will focus on healthcare and public health, including the Personalized Medicine Strategy led by Carlos III Health Institute (ISCIII) and an increase in the National Center for Microbiology and Epidemiology's budget. Funding of €69.5 million (\$84.2 million) is designated for preparing for and responding to pandemics, including the Higher Council for Scientific Research's (CSIC) Global Health Platform.

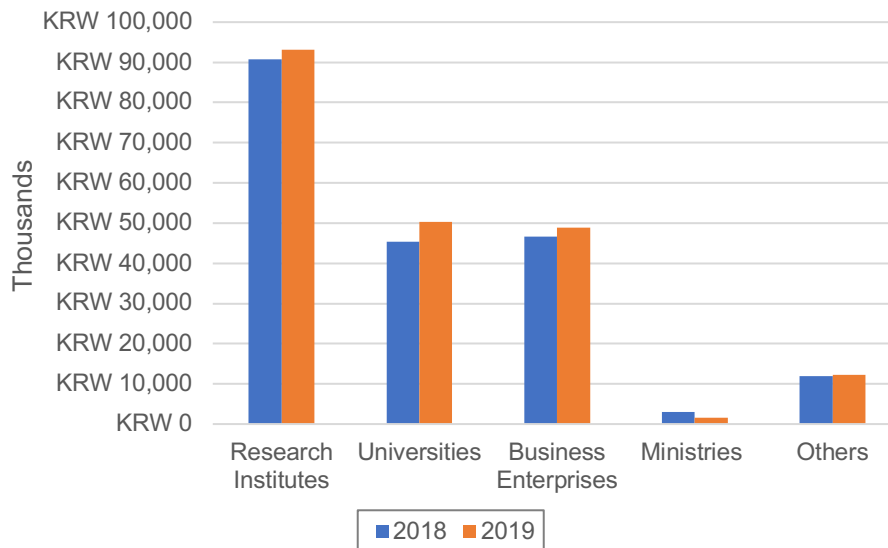
Outside of healthcare, the CSIC will receive €40 million (\$47 million) (for development of new energy technologies, and quantum technology R&D for production will receive more than €15 million (\$18 million).

**Source:** *ciencia.gob.es* (October 30)

## South Korea

According to the latest edition of the "100 Main Science & Technology Indicators for Korea," R&D investments continued to rise in 2019. Government budget allocations or outlays for R&D rose 5.7% to KRW 208,532 million (\$179,008 million).

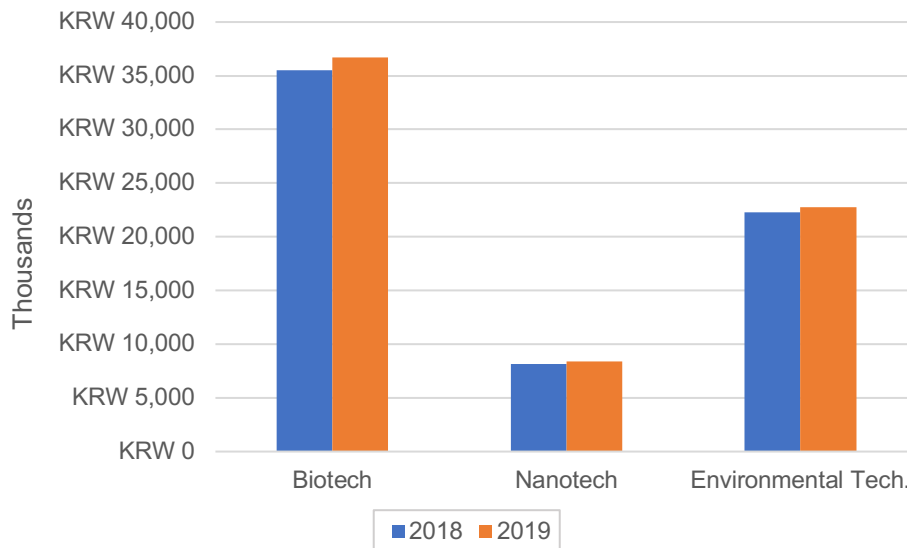
**South Korea GOVERD by Performance Sectors, 2019**



Source: Ministry of Science and ICT, Korea Institute of S&T Evaluation and Planning

Government intramural expenditure on R&D (GOVERD) grew 4.3% to KRW 206,254 million (\$117,053 million), with the number of projects up 10.4% to 70,327. Research Institutes received nearly half (45%) of GOVERD. By type of research, basic expenditures rose 4.0% (33% of total), Applied rose 10.1% (22%) and Development grew 0.8% (46%) (see table). By ministry the Ministry of Science and ICT gained the largest proportion of GOVERD (34%) with funding up 4.6%. By selected future emerging technologies, Biotech, Nanotech and Environmental Tech GOVERD (see table) increased 3.4%, 2.8% and 2.0%, respectively.

#### South Korea GOVERD by Selected Future Emerging & Technologies, 2019



Source: Ministry of Science and ICT, Korea Institute of S&T Evaluation and Planning

**Source:** *Ministry of Science and ICT, Korea Institute of S&T Evaluation and Planning* (December 11)

# News

## Sequencing

### Company Announcements

In November, **Agilent Technologies** signed a memorandum of understanding (MOU) with **GI Innovation (GII)**, a Korean clinical-stage biopharmaceutical company. The MOU establishes a framework in which the two companies will enter into a strategic partnership to explore potential genomic biomarkers of the tumor microenvironment in an early-phase trial of the investigational compound GI-101. This is Agilent's first partnership of this kind in Korea. The Agilent NGS panel tumor profiling assay that will be used enables genomic profiling of more than 500 cancer-related genes in a single assay with measurement of tumor mutational burden (TMB) including microsatellite instability-high (MSI-H), as well as variants characterization in tumor suppressor genes and genes involved in homologous recombinant repair (HRR), important emerging biomarkers in immuno-oncology.

The **Access to Comprehensive Genomic Profiling Coalition (ACGP)** announced that seven diagnostics and lab service providers have joined: **Exact Sciences, Foundation Medicine, Illumina, LabCorp, QIAGEN, Roche Diagnostics** and **Thermo Fisher Scientific**. The goal of the organization is to collectively advocate for appropriate broad US health insurance coverage of comprehensive genomic profiling for patients living with advanced cancer.

In November, clinical genomics company **PierianDx** and executive search firm Bench International announced the appointment of Mark McDonough as CEO and a Board member. He most recently served as CEO and board member for **Immunis.AI**. He succeeds Chairman and Interim CEO Joe Boorady, who remains as Chairman.

**PierianDx** announced in December an expanded partnership with **Illumina** to enable PierianDx genomic reporting solutions for use with AmpliSeq for Illumina Focus Panel, AmpliSeq for Illumina Myeloid Panel and the TruSight Hereditary Cancer Panel.

In December, **Illumina** announced that its NextSeq 550Dx NGS System received approval from China's **National Medical Products Administration (NMPA)** for genetic testing and diagnosis. The NextSeq 550Dx is Illumina's second clinical-grade sequencer to receive NMPA regulatory approval, following the 2018 approval of the MiSeq Dx. The NextSeq 550Dx has been cleared for IVDs in more than 40 countries.

In December, **Illumina** announced that Australia's **Victorian Government** collaborated with the **University of Melbourne** and Illumina to secure a \$60 million investment for the Illumina–University of Melbourne Genomics Hub. The Hub combines Illumina's industry expertise with the support of the University of Melbourne's research and student body. According to Illumina, it is the first hub of its kind.

In December, **Weill Cornell Medicine, NewYork-Presbyterian Hospital** and **Illumina** announced a collaboration to sequence the complete human genomes of thousands of consenting patients in order to identify genetic alterations driving disease and potentially reveal previously unidentified therapies for treatment. The initiative, which also includes a collaboration between Weill Cornell Medicine, NewYork-Presbyterian Hospital and the **New York Genome Center (NYGC)**, aims to evaluate the diagnostic potential of whole genome sequencing at scale. Under the initiative, which originates from **Weill Cornell Medicine's Englander Institute for Precision Medicine**, doctors at Weill Cornell Medicine and New York-Presbyterian/Weill Cornell Medical Center will offer qualifying patients the option to have their genomes sequenced as part of their diagnostic workups.

**Illumina** and **Harvard Pilgrim Health Care** announced in December a risk sharing agreement to make whole genome sequencing (WGS) available to certain Harvard Pilgrim members, effective January 1, 2021. The program will leverage WGS to support faster diagnoses of genetic diseases in children. Through this agreement, Harvard Pilgrim and Illumina will work together to evaluate how insurance coverage of WGS impacts patient care and healthcare costs. During the term of the agreement, Harvard Pilgrim will cover WGS through their network of lab providers for pediatric patients meeting specific criteria. Illumina and Harvard Pilgrim will share the risk on genetic testing costs.

**TwinStrand Biosciences** announced in November it entered into agreement to sublicense two foundational patent families to molecular information company **Foundation Medicine** and its affiliates relating to TwinStrand Duplex Sequencing error-correction technology.



Duplex Sequencing increases the accuracy of NGS as much as 10,000 times, according to the company, allowing the detection of ultra-low frequency mutations.

**Omniome**, a developer of a novel DNA sequencing platform, appointed Robert Wicke as CEO in November. He served most previously as CEO of **Halo Labs**.

Third quarter revenues for **HTG Molecular Diagnostics**, a life science company whose mission is to advance precision medicine fell 67.1% to \$1.8 million (see Bottom Line). Product and product-related services sales declined 60.5% to \$1.7 million, while Collaborative development services revenue was down 93.0% to \$0.76 million. The company ended the quarter with \$30.5 million in cash, cash equivalents and short-term available-for-sale securities.

In November, **HTG Molecular Diagnostics** announced that as a result of its 1-for-15 reverse stock split, its common stock will begin trading on a split-adjusted basis on the **Nasdaq** effective November 23. Holders received a cash payment in lieu of fractional shares.

According to a November report on *Nordic9*, **Single Technologies**, developer of the Theta 3D sequencing platform, raised \$6.1 million, adding to the \$3 million previously raised. The platform utilizes confocal scanning and nanofluidic technology to combine NGS and spatial genomics.

**OHMX.bio**, a provider of omics solutions, and IVD testing firm **Fujirebio Europe** were awarded a €720,000 (\$872,771) research grant from **Flanders Innovation & Entrepreneurship (VLAIO)** to develop a clinical IVD platform incorporating third-generation sequencing technologies. The IVD-seq project will initially focus on a cost efficient, accurate and portable IVD modular solution for highly polymorphic regions.

### Product Introductions

**Twist Bioscience**, a company offering high-quality synthetic DNA using its silicon platform, announced in November the availability of the Twist Comprehensive Viral Research Panel, an NGS panel that includes more than 3,000 viral genomes. The panel is bundled with an analysis platform from OneCodex to enable an end-to-end workflow.

In November, **Twist Bioscience** and **Biotia**, a company that uses analytical software for infectious disease diagnostics, made available the RUO SARS-CoV-2 NGS Assay. The Assay is a highly sensitive nucleic acid hybridization capture-based assay used for detection, characterization and environmental monitoring of the SARS-CoV-2 virus. The test spans both diagnostic methods and vaccine research.

**Oxford Nanopore** released in November the MinKNOW App for iOS and Android devices. MinKNOW is the operating software that drives nanopore sequencing devices. It carries out several core tasks, including data acquisition, real-time analysis and feedback, local base calling and data streaming, while providing device control including selecting the run parameters, sample identification and tracking, and ensuring that the platform chemistry is performing correctly.

In December, **Oxford Nanopore** announced several new releases, including improvements in its PromethION flow cells that have enabled a new 10 Terabase sequencing record, modal single-read accuracy of 99.1% using a new sequencing chemistry currently in development, high-accuracy variant calling tools and automation options for nanopore sequencing experiments at any scale. In November, Oxford Nanopore started to ship PromethION flow cells that incorporate a number of iterative improvements in yields and consistency. These improvements have culminated in a 10 Tb internal run using all 48 Flow Cells, a 25% improvement over the previous record.

**HTG Molecular Diagnostics** launched in December an Early Access Program for its whole transcriptome panel using the HTG EdgeSeq technology. It features the ability to run small sample sizes without requiring RNA isolation and purification and the ability to successfully process low-quality samples.

### Sales and Orders of Note

In December, **Agilent Technologies** announced its clinical informatics platform Alissa Interpret was adopted by the **North West Genomic Laboratory Hub (NW GLH)** based in Manchester and Liverpool, part of **Manchester University NHS Foundation Trust**, England. The NW GLH and its partners are responsible for delivering genomic testing across the whole of the North West. Alissa Interpret, which enables clinical genetics labs to standardize and automate variant triage, review, classification and reports on NGS data, becomes 1 of 2 platforms the NW GLH will use to analyze genomics data.

**Pacific Biosciences of California**, a provider of high-quality sequencing of genomes, transcriptomes and epigenomes, announced in December that the **UK's Edinburgh Genomics, Oxford Genomics Center and University of Liverpool Centre for Genomic Research** each added Sequel II or Sequel IIe Systems to expand the delivery of highly accurate long-read sequencing services.

## MS & LC/MS

### Company Announcements

In November, **Megadalton Solutions**, an early-stage biotech with expertise in large-molecule analysis by Charge Detection Mass Spectrometry (CDMS), announced the expansion of a collaboration with **Waters** to bring CDMS technology to a broader set of applications and potential customers in biopharma. The CDMS detector provides a high-throughput analytical tool for the cell and gene therapy sectors. Waters became a strategic investor in the firm in 2020.

In December, **Waters** formally expanded its long standing collaborative relationship with Dr. Sunghwan Kim of **South Korea's Kyungpook National University** to further explore the use of Waters' ion mobility spectrometry (IMS) in the investigation of compounds in complex mixtures, such as oil. In addition, they will work to characterize complex advanced materials used in high-technology products, such as those found in electronics.

**Lipidomics Consulting**, together with scientists at the **University of Wollongong (UoW), Maastricht MultiModal Molecular Imaging Institute (M4I), MOBILion Systems** and **Merck & Co.**, announced in November that they have received a grant from the **Michael J. Fox Foundation for Parkinson's Research (MJFF)** and its partner, the **Shake It Up Australia Foundation**. The group will work to identify alterations in the metabolism of selective glycosphingolipids in specific brain regions that contribute to early Parkinson's onset and accelerated progression rates. MOBILion Systems' high-resolution ion mobility (SLIM) technology will provide glycosphingolipid measurements.

In November, **JEOL USA**, a supplier of mass spectrometers, electron microscopes, and NMR spectrometers, announced that it began collaborating with **Think20 Labs** to provide improved and more precise analytical techniques to the cannabis testing market. Think20

Labs is a start-up company based in California that is licensed by the **California Bureau of Cannabis Control** to test cannabis, hemp and cannabis-related consumer products for regulatory requirements. The strategic partnership aims to develop cannabis-specific methods for the analysis of trace pesticides and terpenes in cannabis products based on the capabilities of JOEL's TQ-4000 MS system.

In November, **Banner Industries**, a flow component distributor for high-purity and industrial manufacturing, announced a partnership with **Atonarp**, effective October 15 for application in fields such as semiconductors. Atonarp's miniature MS products cater to processes that require advanced molecular analysis for a variety of markets, including pharmaceutical, semiconductor, industrial and biological applications.

In December, **Newomics**, a biotech company developing and commercializing MS solutions for molecular detection applications, announced the closing of a \$7.9 million Series B financing, led by **MSA Capital**. Joining the round were new investor **LDV Partners**, and existing Series A investors, including the **Berkeley Catalyst Fund** and the **Photon Fund**.

## Product Introductions

In November, **Shimadzu Scientific Instruments** launched the RUO Amyloid Mass Spectrometry Service for early screening of amyloid-positive subjects in the US. This simple blood analysis method enables early and accurate prediction of amyloid pathology in the brain, according to the company. The blood analysis works using a combination of immunoprecipitation and MALDI-TOF MS (IP-MS)

## Chromatography

### Company Announcements

In November, **Agilent Technologies** announced that a collaboration with **SGS** resulted in a new GC/TQ method, the SGS AXYS Method 16130, approved by the **US EPA** as an alternative method for the future regulation and detection of dioxin. The previous US EPA dioxin testing method, EPA 1613B, required the use of magnetic sector instruments.

Third quarter sales for **Repligen**, which develops and commercializes bioprocessing technologies and systems, grew 35.4% to \$94.1 million, including 31% organic growth, with COVID-related revenues accounting for approximately 14% of total sales. Non-COVID organic sales grew 17%, including more than 30% growth related to gene therapy. By product line, process analytical sales rose approximately 30%, protein sales were up close to 20% and filtration demand grew over 50%.

**Repligen** raised its full-year revenue forecast to \$348–\$352 million and overall revenue growth to 29%–30%, including 23%–24% organic growth, up from July's estimate of 18%–21% growth. COVID-related sales are expected to represent 10% of 2020 revenues. For the year, on an organic basis, Repligen expects filtration sales to be up 35%, 15%–20% growth from the OPUS product line, 25%–30% pro forma growth for process analytics, and protein sales to grow 15%–20%.

In December, **Repligen** announced the closing of an underwritten public offering of an aggregate of 1.725 million shares of its common stock at a public offering price of \$181 per share. The offering of the shares is expected to result in approximately \$298 million in net proceeds to Repligen after deducting underwriting discounts and commissions and other estimated offering expenses payable by Repligen.

In November, **Alpha MOS** named **John Morris Group** as a distributor for Australia and New Zealand.

In December, **Bormioli Pharma** acquired **ISO Arzneiverpackungen**, a German company specializing in the production of pharmaceutical packaging, including tubular glass vials designed for the injectable drugs and chromatography vials.

In December, **Global Allied Processing Solutions (G-APS)** announced its strategic focus on the global organic material industry. Founding members **RotaChrom Technologies**, the developer of an industrial-scale centrifugal partition chromatography technology platform, and **Heidolph Instruments**, a provider of premium laboratory equipment, created G-APS to further establish best practices for the processing of raw materials. G-APS' goal is to provide businesses with one-stop-shop access to multiple solutions for their processing and manufacturing infrastructure needs, with a specific focus on the extraction and purification of botanically derived compounds and molecules.

## Product Introductions

In November, **Shimadzu** launched the Advanced i-Series HPLC, encompassing the LC-2050 and LC-2060. Compared to the i-Series, the Advanced i-Series boasts increased pressure resistance and additional functions to support remote work including working from home. Since its release in 2014, the original i-Series HPLC has achieved sales of over 20,000 units.

**Shimadzu Scientific Instruments** debuted in November the ELSD-LT III evaporative light scattering detector. It uses a high-power semiconductor laser as the light source, which enables sensitivity approximately 10 times higher than that of conventional products, the highest level of sensitivity for an ELSD, according to the company. The ELSD-LT III achieves a wide dynamic range of 5 orders of magnitude, providing simultaneous determination of high-concentration and trace components without gain switching.

**PerkinElmer** launched in November the LC 300 platform and SimplicityChrom software, bringing together advanced HPLC and UHPLC capabilities with intuitive instrument control and data analysis for the food, cannabis, pharmaceutical and chemical arenas. The versatile platform features multiple detector options and third-party driver support for commercially available CDS systems.

In November, **Alfa Chemistry**, a supplier of analytical chemistry reagents, announced the release of a variety of chromatography standards, mainly for the purpose of calibration.

**Activated Research Company (ARC)** unveiled in November a stop-flow modulation solution for comprehensive GCxGC, allowing it to be an attainable configuration for any analytical laboratory, according to the firm. ARC's solution takes advantage of stop-flow modulation and allows for low cost implementation; simple, easy installation; increased peak capacity through comprehensive analyte transfer; unattended or remote operation; streamlined operation through dedicated software; and straightforward switching between 1D and 2D GC.

In December, **Orange Photonics** launched the LightLab 3 Cannabis Analyzer Law Enforcement Version, specifically designed to support rapid presumptive and quantitative cannabis analysis by non-technical personnel in a non-laboratory setting. LightLab 3 Cannabis Analyzer, compliant with US Department of Agriculture hemp testing technology requirements, is the only portable HPLC on the market, according to the firm. In

quantitative mode, it measures up to 11 cannabinoids including D9THC and CBD, with a limit of detection of 0.5%–0.05% depending on sample type.

## Sales and Orders of Note

**AgraFlora Organics** announced in November that it added an **Agilent Technologies** HPLC for its 51,000 ft<sup>2</sup> (4,738 m<sup>2</sup>) automated edibles manufacturing facility in Winnipeg, Canada.

**Purolite**, a manufacturer of resin-based separation, purification and extraction technologies, announced it will supply its Protein A capture resin, Praesto Jetted A50 to **WuXi Biologics**. WuXiBiologics, a global company with leading open-access biologics technology, will utilize Praesto Jetted A50 to provide its customers with additional choices for affinity chromatography resins for a range of downstream processes for mAb purification. The Praesto line of agarose-based chromatography resins are currently utilized in over 200 screening projects and ongoing clinical trials.

*Cape Business News* reported in November that **WearCheck**, a condition monitoring lab, purchased four new chromatography systems from **PerkinElmer** for its transformer division labs in Johannesburg, Durban and Cape Town, South Africa.

## Bioprocess

### Company Announcements

**Gemini Bioproducts**, a supplier of cell culture solutions and a portfolio company of **Bel Health Investment Partners**, announced in August a US distribution agreement with **Scinus Cell Expansion Netherlands** for the Scinus Cell expansion bioreactor system.

In October, life sciences firm **Cytiva** announced it plans to open its new 80,000 ft<sup>2</sup> (7,432 m<sup>2</sup>) manufacturing facility in Shrewsbury, Massachusetts, by the end the year as part of its five-year, \$500 million investment to expand its global manufacturing capacity. The facility will significantly increase Cytiva's capacity to manufacture Xcellerex Bioreactors and will

free up capacity in its Westborough facility to manufacture complementary single-use technologies. The new facility will have five manufacturing lines operating 24/7, a new clean room and an R&D lab.

In November, **Cytiva** announced deals pledging to invest in fields of manufacturing, bioprocess development and research to accelerate the development and manufacture of therapeutics and benefit patients in China and beyond. Cytiva and manufacturer **Wego** announced plans to triple single-use manufacturing capacity in Asia Pacific to produce bags, components and other customized products. A comprehensive strategic partnership with vaccine producer **Zhifei** allows the pair to work on process development, raw material supply, service and personnel training. Under the upgraded partnership with **Clover Biopharmaceuticals**, Cytiva will help the global clinical-stage biotech company add two more 2000 L bioreactors for a total of 4 x 2000 L manufacturing capacity through the Cytiva FlexFactory (see below). Cytiva also committed to creating a "Joint Lab on Human Collagen New Material" with pharmaceutical company **Jinbo**.

**Cytiva** expanded its offering at its Fast Trak research and training facilities in December in South Korea, Japan, Cambridge, UK, and Uppsala, Sweden. The expanded offering will support the growing cell and gene therapy industry, complementing current services provided in Shanghai, Toronto, and Marlborough, Massachusetts. Process development, media and assay development, and contract development services for preclinical through Phase 1 manufacturing will now be offered at all locations.

**Erbi Biosystems**, a microfluidic bioprocess instrumentation company, announced in October that it closed a finance round which brings the total investment received to nearly \$4 million. The round was led by **Jaguar Biotech**. The funding will be used to expand manufacturing, sales and support of the 2 mL TruePerfusion Breez bioreactor and also to support further technology and product development. Erbi's technology will expand to cover all scaled down unit operations in bioprocessing.

In November, **MilliporeSigma** and biotherapeutics company **Transcenta**, announced a strategic technology collaboration to implement continuous manufacturing for protein therapeutics. The unique model of collaboration brings the teams together in real time to converge single-use, continuous and digital bioprocessing technologies for the further development of Transcenta's integrated continuous bioprocessing (ICB) platform. As part of the initiative, MilliporeSigma and Transcenta will co-develop a first-of-its-kind, single-



use flow-through polishing system. This highly collaborative relationship leverages MilliporeSigma's BioContinuum Platform.

**MilliporeSigma** announced in December the broadening of its manufacturing footprint in Massachusetts. One expansion will add 65,000 ft<sup>2</sup> (6,039 m<sup>2</sup>) of space to its Danvers single-use assembly operations, adding to the existing 120,000 ft<sup>2</sup> (11,148 m<sup>2</sup>) facility. The expansion will add the capacity across several portfolios, including MilliporeSigma's Mobius single-use consumables. The total investment in Danvers is about \$25 million and will add approximately 400 jobs throughout 2021. Jaffrey expansion plans include adding 25,000 ft<sup>2</sup> (2,323 m<sup>2</sup>) to the existing 260,000 ft<sup>2</sup> (24,155 m<sup>2</sup>) facility. The additional capacity will support filtration devices and membrane products, specifically Durapore filters, Express filters and the Viresolve product lines. The total investment in Jaffrey is about \$22 million and is expected to bring nearly 275 roles by 2022, once completed.

In December, **RoosterBio**, a supplier of cellular therapy bioprocess tools and scalable manufacturing solutions for regenerative medicine, entered into an exclusive agency agreement with **Sartorius Korea Biotech** for its advanced platform of RUO and cGMP-grade hMSC working cell banks, optimized paired media and hMSC bioprocess systems.

In December, CRO **Evotec** and **Sartorius** entered into a partnership with **Curexsys**, a German firm specializing in therapeutic exosomes. Curexsys delivers an isolation technology for exosomes based on a traceless immune-affinity process. Evotec and Curexsys will collaborate with the production of hMSCs, which serve as a source for exosomes. Evotec and Sartorius have formed a consortium to jointly invest in Curexsys' €8.2 million (\$9.9 million) seed financing round with Evotec acquiring an equity stake of approximately 37% and Sartorius acquiring an approximately 21% stake. The partnership combines Evotec's industrial-grade iPSC and PanOmics platforms with Curexsys' exosome isolation technology and Sartorius' ability to translate these into a fully GMP-compliant process.

### Sales and Orders of Note

**ABEC**, a provider of integrated solutions and services for biopharmaceutical manufacturing, announced in October it is delivering process systems to CDMO **Ology Bioservices** (Ology Bio) to support their production of critical vaccines and therapeutics for COVID-19. ABEC is providing these systems to Ology Bioservices' Medical

Countermeasures Advanced Development and Manufacturing (MCM ADM) facility in Alachua, Florida.

In October, **ABEC** announced it will be providing CSR single-use mammalian cell culture and microbial fermentation systems, including the industry's first 6,000 L single-use bioreactor, to **BioInno Bioscience's** new contract development and manufacturing facility in Suzhou, Jiangsu, China. The facility is expected to be operational by mid-2021.

In November, **ABEC** announced that **New England Biolabs (NEB)** selected ABEC to expand production capacity at their manufacturing facilities in Ipswich and Rowley, Massachusetts. NEB will utilize multiple customized stainless-steel fermenters for high-density *Escherichia coli* fermentation. Delivery of the ABEC 400 L and 1000 L fermenters is expected by mid-2021.

**ABEC** announced in November that **Qilu Pharmaceutical** again selected ABEC to rapidly expand production capacity at Qilu's cGMP manufacturing facility in Jinan, Shandong, China. ABEC is delivering several sets of large-scale, stainless steel, cell culture bioreactors. ABEC's large-scale bioreactors previously installed at Qilu are currently the largest in operation in China.

In October, **Cytiva** announced it will provide its FlexFactory to **Akron Biotech**, a provider of cGMP-compliant solutions to support advanced therapy development. FlexFactory is a flexible, single-use platform that will enable Akron Biotech to manufacture plasmid DNA. This will be the first Cytiva FlexFactory to be used in the manufacture of plasmid DNA. There are more than 70 FlexFactory installations worldwide.

In November, **Cytiva** announced it is installing its first FlexFactory in the Middle East and North African region as part of **Saudi Vax's** planned Saudi Vaccine and Bioprocessing Center (SVBC), a Saudi government-funded project led by **King Abdulaziz City for Science and Technology** and the **National Industrial Development Center**. The SVBC will use Cytiva's FlexFactory to manufacture halal vaccines and biologics in-region, for-region.

In November, life science firm **Cytiva** announced it is supporting **Clover Biopharmaceuticals**, a global clinical-stage biotechnology company, to help accelerate the development and manufacturing of a protein-based S-Trimer subunit vaccine candidate. Clover aims to quickly expand its current 2 x 2000 L capacity of the Cytiva FlexFactory,

which went into service in January. Cytiva will help Clover add two more 2000 L bioreactors for a total of 4 x 2000 L manufacturing capacity through the Cytiva FlexFactory.

## Process Analysis

### Product Introductions

In October, **Shimadzu** introduced the TOC-1000e, the first analyzer in the eTOC Series of online TOC analyzers designed for pure-water applications. The TOC-1000e has the world's smallest and lightest cabinet, according to the company, with a detection limit of 0.1 µg/L, making it ideal for fields requiring high-purity water, including pharmaceuticals, semiconductors, food & beverages, chemistry and precision equipment.

## Materials Characterization

### Company Announcements

This summer, **Element Materials Technology**, a materials and product qualification testing firm, made a strategic investment in **Plastometrex**, a start-up developing technical and software-led solutions for testing in material science. Plastometrex is pioneering alternative techniques to conventional mechanical testing methods that utilize advanced numerical modelling, optimization algorithms and machine learning to accurately predict plasticity, residual stresses and creep parameters from indentation test data.

In August, **CANNON Instrument**, whose products include viscometers, rheometers, flash point testers and physical property testing equipment, announced a 12,000 ft<sup>2</sup> (1,115 m<sup>2</sup>) addition to its facility, expanding it to 50,000 ft<sup>2</sup> (4,645 m<sup>2</sup>).

In October, **Stanhope-Seta**, a supplier of petroleum analyzers, announced that the **Canadian General Standards Board** confirmed the inclusion of ASTM D8073 (WSI) in mandatory Table 1 of the Canadian Jet fuel specification, CGSB 3.23-2019 of its Water Separation Instrument (WSI) SA-9000-0>.

In November, **Halo Labs**, a life science instrumentation company developing tools for biologics researchers, named Rick Gordon as CEO and Board member. He replaces Robert Wicke who resigned in October but remains on the Board. Mr. Gordon most recently served as the Vice President of Global Sales for Halo Labs.

**H.E.L Group**, a developer and manufacturer of innovative laboratory tools for process optimization, safety and scale-up including the BTC 500 adiabatic calorimeter, announced in November full regulatory compliance for its battery testing protocols and equipment in China associated battery packs for electric vehicles, with a focus on mechanical, electrical and thermal stress.

### Product Introductions

In September, **NanoTemper Technologies**, which creates tools that address challenging characterizations, introduced the Prometheus Panta, a multi-parameter stability characterization instrument. It combines dynamic light scattering for particle size determination with nanoDSF (a label-free version of differential scanning fluorimetry), for thermal unfolding and back reflection for aggregation. Applications include biologics formulation optimization, developability or comparability assessments. According to the company, for the first time, researchers are able to correlate particle sizing, thermal unfolding and aggregation results collected throughout an entire thermal ramp.

In September, **CANNON Instrument** launched a new model to the CANNON TESC lineup, model TESC-5133. The compact, economical TESC-5133 (Thermoelectric Sample Conditioner System) integrates and automates the ASTM D5133 process of conditioning and testing low-temperature viscosities of engine lubricants. Incorporating a Brookfield DV2T digital viscometer, with an easy lift system to simplify positioning of the viscometer head, and a thermoelectrically controlled sample chamber, the TESC-5133 automates the entire conditioning and testing process, recording sample temperatures and viscosities throughout the test then computing the temperature (Gelation Index Temperature) at which there is a rapid change in viscosity (Gelation Index).

**Setaram** announced in September the THEMYS ONE is an accessible and versatile thermal analysis platform for temperature, mass variation, heat and heat flow, and evolved gas measurements. The THEMYS ONE+ version offers high throughput with its 32-position autosampler. It can reach temperatures as high as 1150 °C or 1600°C.

In October, **Halo Labs** introduced the Aura BMI, a non-fluorescence version of its Aura particle characterization platform. It adds improved optics for greater sensitivity, increased linear range and the option to upgrade to fluorescence particle identification for full Fluorescence Membrane Microscopy. The Aura BMI option delivers the ability to meet requirements of both low-volume and large-volume testing.

In October, **Buehler** released its newest Rockwell Hardness Tester, the Wilson RH2150, an updated more advanced Rockwell tester with easy programmability, advanced calculations and even verification reminders to ensure compliance. The RH2150 is available in two different sizes, with a vertical capacity of 10 in and 14 in (254 mm and 356 mm), respectively.

# Bottom Line

Reported Financial Results								
\$ in Millions USD	Period	Ended	Sales	Chg.	Op. Prof.	Chg.	Net Prof.	Chg.
Datacolor*	FYE	30-Sep	\$61.00	- 22.6 %	\$0.30	- 94.6 %	\$41.60	-5.9%
HTG Molecular Diagnostics	Q3	30-Sep	\$1,777.10	- 67.1 %	\$5,171.53	- 11.9 %	\$5,411.79	-14.2%
IDEX (Health & Sci Tech.)	Q3	30-Sep	\$49.91	24.3 %	\$50.89	-7.0%	NA	NA
Kewaunee Scientific**	Q2	30-Sep	\$39.00	-1.8%	-\$0.01	71.8 %	-\$0.17	92.4%
MTS Systems*	Q4	30-Sep	\$215.06	-4.0%	-\$283.26	NM	-\$280.68	NM
MTS Systems (Test & Simulation)*	Q4	30-Sep	\$128.00	-4.5%	-\$96.35	NM	NA	NA
MTS Systems*	FYE	30-Sep	\$726.03	-7.2%	-\$247.49	NM	-\$272.05	NM
MTS Systems (Test & Simulation)*	FYE	30-Sep	\$490.63	- 12.2 %	-\$90.46	NM	NA	NA
Nanalysis Scientific	Q3	30-Sep	\$1.70	3.6%	-.434	NM	-\$1.10	- 268.8 %
Pressure Biosciences	Q3	30-Sep	\$533.86	6.5%	-\$818.76	23.4 %	\$3,675.72	NA
<b>Other Currencies (in Millions)</b>								
Diploma*	FYE	30-Sep	£538.40	-1.2%	£87.10	- 10.4 %	£49.80	-20.2%

## Instrument Business Outlook

Bottom Line

Eurotech	Q3	30-Sep	€ 16.38	- 38.5 %	€ 0.69	- 84.0 %	€ 0.10	-96.9%
GL Sciences**	Q2	30-Sep	¥13,210.0 0	12.5 %	¥1,859.0 0	49.7 %	¥1,026.0 0	-99.8%

Source: Company financial reports

\*For year ending Sept. 30, 2020

\*\*For year ending March 31, 2021

NA = Not Available

NM = Not Material