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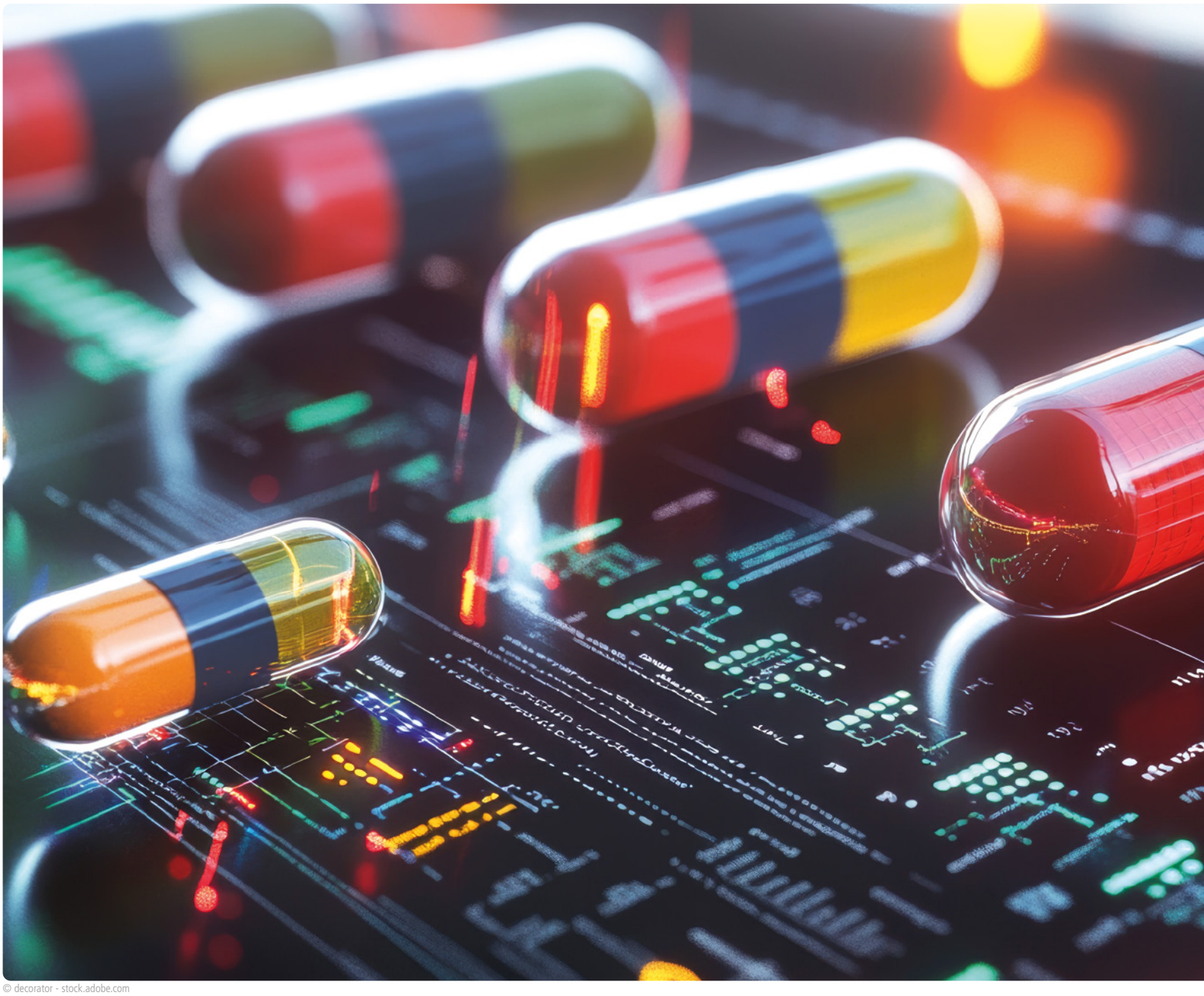

Pharma & Biotech

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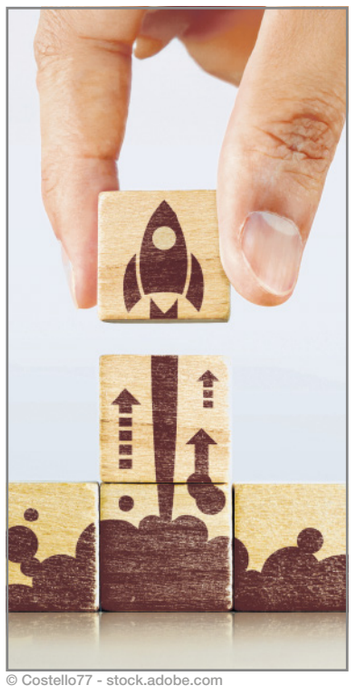

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Pharma & Biotech

Markets & Companies

Chemicals & Materials

Innovation

Stability in Motion

Strategic Response to a Shifting Pharma Landscape

In a time marked by global uncertainty—from shifting trade policies to evolving healthcare demands—the pharmaceutical industry faces mounting pressure to deliver both innovation and resilience. Bayer's Pharmaceutical Division, under the leadership of Stefan Oelrich, has embarked on a strategic transformation aimed at reinforcing stability while advancing its long-term vision. In this interview, Christene Smith from CHEManager discusses with him how Bayer is navigating external volatility, reshaping its internal structures, and investing in future-ready capabilities to ensure sustainable growth.

CHEManager: Given the current unpredictability in global trade—ranging from shifting tariff regimes to geopolitical tensions—how is Bayer's Pharmaceuticals division building resilience into its supply chains and market strategies to maintain stability in such an unstable external environment?

Stefan Oelrich: At Bayer Pharmaceuticals, we are taking several strategic steps to build even more resilience into our supply chain and market strategies. We are closely monitoring geopolitical developments through an established task force and implementing immediate mitigation measures at both the product and supply chain levels. We continue to review and adapt our internal and external supply network to further increase resilience, agility, and flexibility.

Have you changed your approach to sourcing critical raw materials and manufacturing active ingredients in light of the supply chain disruptions experienced during the pandemic or the current VUCA environment?

S. Oelrich: We continue to pursue a systematic approach of comprehensive risk mitigation measures encompassing evaluation of our sourcing strategies, risk analyses, and the use of multiple sourcing channels. We continuously assess our internal and external manufacturing footprint. These steps ensure that our suppliers meet regulatory requirements focused on product quality and availability.

Bayer recently restructured its Pharmaceuticals leadership team and introduced a new operating model. What were the key drivers behind this transformation, and how do you envision it enhancing stability and growth?

S. Oelrich: As part of our journey to become more mission-centric and value-focused, we have shifted from functional silos and multi-hierarchical layers towards a new operating model rooted in Product and Customer Teams. Within this new setup, we have restructured our Leadership Team to include, for example, a new Chief Operating Officer role, the goal of which is to further enhance customer value, maximize market opportunities, and generate revenue growth and profitability for Bayer Pharmaceuticals. We have also created a new 'Global Commercialization' organization which marries elements of our former Strategic Business

Stefan Oelrich, Member of the Board of Management and President Pharmaceuticals, Bayer

Unit Oncology, Global Marketing, and Digital & Commercial Innovation, with parts of Medical Affairs and Pharmacovigilance. The resulting closer collaboration between R&D and Commercialization is enabling the integration of commercial insights into early development and decision-making, which is paving the way for enhanced stability and future growth.

Looking back over the past year since the creation of the Global Commercialization unit, how has this structural shift influenced Bayer's go to-market strategy across regions—and what tangible outcomes or lessons have emerged from this new model?

S. Oelrich: Our Global Commercialization unit was created to help drive commitment to collaboration across early R&D, global product strategy and commercialization to advance innovation, create better outcomes for patients, and enable us to make a lasting impact in the field of medicine.

This agile, integrated approach across geographies enables us to bring our most promising therapies to patients faster. We are seeing many concrete outcomes of our collaborative product-centric teams, including, for example, accelerating a regulatory filing timeline by six weeks (versus the industry standard) within our prostate cancer product team.

Bayer has made significant investments in incubator centers, such as investing in the Bayer Co.Labs in Berlin, Cambridge, Kobe, and Shanghai. How do these investments contribute to long-term portfolio stability?

S. Oelrich: We have created our global Bayer Co.Lab incubation model and global network to help early-stage startups to accelerate the development of their groundbreaking ideas towards the clinic. Due to the highly innovative nature of early-stage startups in the biopharmaceutical arena, we believe a significant proportion of the next generation of transformative medicines and technologies will be advanced by startup companies. Through a careful selection process, we identify top teams who are advancing science that aligns to Bayer's own research and strategic portfolio planning, thus establishing trustworthy relationships from the get-go.

How do you balance high-risk, high-reward innovation with the need for predictable, stable revenue streams?

S. Oelrich: High-risk, high-reward innovation is not necessarily a risk to stable revenue streams. While raising the bar for innovation increases technical risk, it can also mitigate significant commercial risks by creating a more differentiated portfolio. Seeking low technical risk might lead to incremental innovation that cannot compete in an environment of high-cost pressure. Ultimately, a more innovative approach can lead to sustainable growth and reduced vulnerability in a competitive market.

Bayer has pursued partnerships and acquisitions to strengthen its development pipeline. What criteria guide your selection of external collaborators?

S. Oelrich: Like most pharmaceutical companies, we pursue source-agnostic innovation and build our pipeline organically and inorganically. When looking externally, we seek to complement our capabilities and our pipeline to reflect our strategic focus areas. When making decisions, we start by assessing the potential value and differentiation of our respective assets. This approach allows us to both maximize our innovation potential and enhance our pipeline.

How is Bayer leveraging digital tools and data to support commercial resilience and patient engagement?

S. Oelrich: Bayer is utilizing advanced technologies including artificial intelligence (AI) and machine learning (ML) to enhance commercial resilience and boost patient engagement. These technologies optimize research and development processes, accelerate drug discovery, and improve clinical trials, thereby bringing innovative treatments to patients more efficiently and effectively. We conduct in-depth analytics by integrating advanced digital tools within robust data-architecture. This enables us to optimize how we identify and engage with patients. Collaborations and partnerships further expand Bayer's digital footprint, offering personalized health solutions and a collaborative ecosystem that supports AI adoption for enhanced patient care. One notable example is an innovative platform which features 3D organ models and mixed reality technology to educate both patients and healthcare professionals about ATTR-CM and related heart conditions. Since its recent launch, this app has been downloaded over 140,000 times and is accessible in six languages.

> *"We are seeing many concrete outcomes of our collaborative product-centric teams, including, for example, accelerating a regulatory filing timeline by six weeks (versus the industry standard) within our prostate cancer product team."*

> *"Due to the highly innovative nature of early-stage startups in the biopharmaceutical arena, we believe a significant proportion of the next generation of transformative medicines and technologies will be advanced by startup companies."*

■ www.bayer.com

Unlocking Tomorrow's Therapies

Strategic Perspectives on Life Sciences Industry Transformation

Asahi Kasei Life Science, the newest growth driver within the Asahi Kasei Group, has been formed to meet the growing demand for bioprocess solutions and contract research services from the global pharmaceutical industry. Under a new organizational structure the division combines biotherapeutics manufacturing equipment, CRO testing and CDMO services. Leading this dynamic organization is Ken Shinomiya, President, who recently also was appointed Head of the company's Healthcare business and will further expand the portfolio and global presence in pharmaceuticals, life science and critical care products and services. CHEManager speaks with him about Asahi Kasei Life Science's strategy, industry trends, and the company's role in shaping the future of healthcare.

CHEManager: Asahi Kasei Life Science has recently launched as a distinct entity within the group. What are your top strategic priorities for the future, and how do you see the company positioning itself as a core growth driver within Asahi Kasei's Healthcare sector?

Ken Shinomiya: Asahi Kasei is a diversified company with operations in the Healthcare, Homes, and Material Sector. The Healthcare sector is the key driver of future growth of the Asahi Kasei Group, and in our current medium-term management plan, we are aiming at almost tripling the annual operating income of this sector, eying 150 billion JPY by 2030.

Within the Healthcare sector, Asahi Kasei Life Science—established in April 2025—is one of the essential building blocks to achieve these goals. Here, Asahi Kasei united its bioprocess-related businesses under one roof to provide a comprehensive, one-stop solution support for our global customers. The businesses include the Planova virus removal filters and BioOptimal Microfilters, contract research organization (CRO) ViruSure in Austria, as well as the US-based Bionique Testing Laboratories and the biologics contract development and manufacturing organization (CDMO) Bionova Scientific. By utilizing and maximizing the synergies among these companies and the strategic advantage of having a pharmaceutical business within the group, we can offer the industry more agile and focused services, deeper innovation in bioprocess solutions, and stronger support in emerging modalities, aiming to become a premium partner for pharmaceutical companies by offering a diverse portfolio of products and services.

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Ken Shinomiya, President, Asahi Kasei Life Sciences

Asahi Kasei has shifted significant operations to the US and expanded manufacturing capacity in both the US and Japan. How do you view the balance between regional and global strategies in serving pharmaceutical clients, especially amid ongoing supply chain and regulatory challenges?

K. Shinomiya: In 2023, we relocated the global headquarters of our Healthcare business to Chelmsford, Massachusetts. The United States is the world's largest healthcare market, and this move enables us to better capture industry trends and make faster decisions—ensuring we remain competitive in a rapidly evolving environment.

Next to being another important market for pharmaceutical businesses, Europe holds a significant importance as a driver for innovation and global healthcare policies in the pharmaceutical market. To address regulatory changes, we maintain close communication with authorities and customers through our local subsidiaries.

Having said that, Japan is home to our Group headquarters and remains a key location for the production and R&D of Planova virus removal filters. From mid-2026, we will be constructing the fourth spinning plant for Planova virus removal filters in Nobeoka, Miyazaki Prefecture.

The industry is anticipating a rebound in M&A activity. What is

your philosophy on acquisitions versus partnerships, and how do you assess opportunities for inorganic growth within the life sciences space to grow your geographical footprint?

K. Shinomiya: Strategic M&A is an essential factor for growing our business. By acquiring companies like Virusure in Austria, and US-based Bionique and Bionova we could further diversify our service range while expanding our global footprint at the same time.

As the pharmaceutical industry trends toward horizontal specialization, how is Asahi Kasei Life Science adapting its service model to become a premium partner for pharma companies, particularly in areas like CRO testing and biologics CDMO services?

K. Shinomiya: We have built trusted relationships with clients, especially in the field of virus removal applications, based on our strong brand and solution capabilities. Leveraging our deep expertise, we aim to expand into service-oriented businesses, including CRO and CDMO services. For CRO services under Virusure and Bionique, we are strengthening lab capacity and introducing new technologies to enhance competitiveness. For CDMO services under Bionova, we are advancing process development and GMP manufacturing for antibody therapeutics, while preparing solutions for new modalities such as gene and cell therapies.

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From mid-2026, Asahi Kasei will begin construction on the fourth plant for Planova virus removal filters in Nobeoka.

> *"By utilizing and maximizing the synergies among these companies and the strategic advantage of having a pharmaceutical business within the group, we can offer the industry more agile and focused services, deeper innovation in bioprocess solutions, and stronger support in emerging modalities, aiming to become a premium partner for pharmaceutical companies by offering a diverse portfolio of products and services."*

Asahi Kasei has a tradition of leveraging creativity and innovation. How do you intend to foster a culture of innovation while scaling globally and maintaining operational excellence?

K. Shinomiya: Over its 100-year history, the Asahi Kasei Group has built a business model rooted in unique technologies and innovative, competitive products and services. Planova virus removal filters with its cellulose-based hollow fibers is a prime example, as it is based on our deep knowledge in cellulose fiber technology which we have been cultivating for more than 90 years. As a result on leveraging know-how into new application fields, the Planova virus removal filters pioneered the virus removal filter industry. Going forward, in addition to in-house development, we aim to further accelerate innovation by incorporating cutting-edge external technologies through acquisitions and small investments, while also leveraging expertise and capabilities both within and outside the company.

In your opinion, what are the most important technological trends in the life sciences that will ensure the effective supply and distribution of healthcare products and services to meet the needs of a growing and aging population?

K. Shinomiya: We believe that technologies aimed at addressing unmet medical needs through new drug development, as well as those that help lower healthcare costs, will have an increasingly important role in shaping the future of life sciences.

The life sciences sector is undergoing rapid digital transformation, particularly with the adoption of generative AI and advanced digital platforms. How is Asahi Kasei Life Science integrating digital technologies into its operations, and what impact do you expect this to have on your business and the broader industry?

K. Shinomiya: At Asahi Kasei Life Science, we are promoting smart factory initiatives in the production of Planova virus removal filters, utilizing automation and digital technologies to improve quality and productivity. In new product development and pharmaceutical manufacturing, we are accelerating research through materials informatics (MI) and strengthening collaboration across R&D units within the Asahi Kasei Group. By doing so, we aim to accelerate the development of products and CDMO/CRO services that contribute to faster drug development and improved yield and titer.

The bioprocessing and biologics CDMO markets are experiencing strong double-digit growth. How is Asahi Kasei Life Science investing in capacity and technology to meet increasing demand for biologics, gene therapies, and new modalities?

K. Shinomiya: Demand for virus removal filters is increasing alongside the growth of the biopharmaceutical market. To ensure stable supply, we completed a new assembly plant for Planova virus removal filters in Nobeoka in May 2024 and decided to build a new spinning plant at the end of July 2025. Through these expansions, we aim to contribute to the safety and productivity of biologics manufacturing. In addition to expanding laboratory capacity for our CRO business, Bionova launched plasmid CDMO services in June 2025 to meet rising demand for gene and cell therapies. We will continue to identify growth opportunities by aligning with market trends and leveraging our expertise in process development.

■ www.asahi-kasei.com

A Fatal Signal for Pharmaceutical Industry

European Pharmaceutical Industry Sees Trump's Tariff Policy as a Considerable Burden

Under the trade agreement concluded between the European Union and the United States at the end of July, exports of pharmaceutical products from Europe to the US will also be subject to a 15% tariff in future. For imports from Switzerland—not a member of the EU—the US Administration has even announced a 39% tariff. And for most goods from the UK, tariffs of 10% have been set. Although pharmaceutical products are still exempt from this, significant levies are also looming here. Companies and associations see this as a break with previous practice and expect significant economic losses. How is the industry responding to the new challenges?

Han Steutel, president of Germany's Association of Research-Based Pharmaceutical Companies (VFA), chooses clear words: "This deal breaks with the fundamentals of transatlantic trade. It undermines the rules of the World Trade Organization and ends the achievement of free trade in medicines. The US is our most important trading partner. This agreement now seals billions in costs for Germany as a pharmaceutical location. This is not good news for jobs and investment."

For decades, WTO agreements have stipulated that there should be no tariffs on pharmaceutical products traded between Europe and the US. This has now come to an end since US President Donald Trump and EU Commission President Ursula von der Leyen shook hands on Trump's Scottish golf course. The agreed tariffs of 15% on European goods also include pharmaceuticals, with a few exceptions and provided they are implemented as planned.

Healthcare Supply Chains Affected

Since then, the industry has been in a state of alarm, as there is a lot at stake: the USA is Germany's most important partner in pharmaceutical trade. According to Pharma data for 2024 of the German Pharmaceutical Industry Association (BPI), around 23% of all German pharmaceutical exports, worth €26 billion, went to the US. In return, Germany imported pharmaceutical products worth €12.4 billion from the US in 2023—around 17% of total imports.

According to Claus Michelsen, chief economist at the VFA, the tariffs are likely to not only lead to significant additional costs for manufacturers, but could also jeopardize international patient care. Oliver Kirst, chairman of the German Pharmaceutical Industry Association (BPI), also speaks of a "fatal signal" for transatlantic economic relations and a "worrying breach of taboo."

The new tariffs also once again expose the vulnerability of global supply chains in the healthcare sector: "If intermediate products, auxiliary materials, or packaging materials become more expensive, this has a direct impact on production and supply. ... We are particularly critical of the fact that supplier components for medical devices such as steel and aluminum will continue to be subject to a 50% punitive tariff—this could have serious consequences for production." In addition, a decline in these trade flows would have significant consequences for production, employment, and research in Germany.

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> *"This agreement now seals billions in costs for Germany as a pharmaceutical location. This is not good news for jobs and investment."*
>
> Han Steutel, president of the Association of Research-Based Pharmaceutical Companies (VFA)

Another industry association, Pharma Deutschland, sees the agreement as a structural risk for the industry: "What may mean predictability for many industries is a strategic burden for European manufacturers in the pharmaceutical sector," says CEO Dorothee Brakmann.

A similar view is held in the European non-EU country of Great Britain. The US has imposed tariffs of 10% on most UK goods, with pharmaceuticals still being excluded. Abi Godfrey, Corporate Finance Director of the auditing and consulting firm Grant Thornton, warns: "UK pharmaceutical companies such as GSK and AstraZeneca sell a huge proportion of their manufactured drugs in the US market—losing tariff-free access would be a grave blow to an industry that is already suffering from fragile supply chains, geopolitical instability, and the effects of Brexit and

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the COVID-19 pandemic". If US trade tariffs are expanded to include pharmaceutical products in the future, the relocation and reinvestment of manufacturing facilities to the US could become a priority for international pharma companies—with many of these sites based in the UK and Ireland. But: "Relocation of manufacturing will come at an astronomical cost to pharma companies and it's not the type of decision to be made overnight", argues Godfrey.

Trump Demands Price Cuts

The tariffs are only one burden on the European pharmaceutical industry. Trump is also demanding that major drug manufacturers significantly lower their US prices, threatening punitive tariffs of up to 250% if they fail to do so. He accuses Switzerland in particular of "making a fortune from drugs" and announced that the United States will impose a basic tariff of 39 per cent on imports from Switzerland from 7 August 2025. Furthermore, at the end of July, the US president gave 17 major pharmaceutical companies, including Pfizer, Novartis, and Boehringer Ingelheim, a 60-day deadline to lower their prices.

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"If intermediate products, auxiliary materials, or packaging materials become more expensive, this has a direct impact on production and supply."

Oliver Kirst, chairman of the German Pharmaceutical Industry Association (BPI)

Risks Posed by Reference Price Discussions

In this context, the BPI believes that the discussion surrounding the introduction of so-called "most favored nation" mechanisms in US drug pricing is also coming into focus. "What at first glance sounds like a measure that would relieve the burden on the US healthcare system poses considerable risks for the European drug supply. If the US were to base its drug prices on the—already lower—European price levels in the future, this would fundamentally change the global price architecture," warns Kirst. "If manufacturers have to fear that the prices they achieve in Europe will directly impact the US market in the future, this will inevitably have an impact on launch decisions. One possible consequence would be that companies deliberately avoid European markets in order not to jeopardize their price base in the US—with direct implications for the supply situation here." Management consultancy Porsche Consulting has done the math: if Trump were to cut drug prices by 60 to 90%, this could reduce the operating profits of large manufacturers by the same amount or more.

Pharmaceutical Companies Under Pressure

A survey conducted by *CHEManager* among European pharmaceutical manufacturers clearly shows that both the new tariffs and the planned price reductions in the US are putting considerable pressure on companies. VFA economist Michelsen: "Initial measures such as stockpiling in the US indicate that companies are considering or reviewing investments in US production capacities in the medium term."

For example, French pharmaceutical company Sanofi has announced

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that it will invest at least $20 billion in the US by 2030 and expand its production capacities. These investments are expected to "create a significant number of high-paying jobs in several states." The company currently employs around 13,000 people in the United States, which represents 16% of its workforce. With sales of just under €20 billion in 2024, Sanofi will generate more than twice as much revenue in the US as in the whole of Europe (€9 billion).

Investments and Production Expansion in the US

The two largest Swiss pharmaceutical companies, Novartis and Roche, had already responded to Trump's initial tariff threat in early April by announcing major investments in the US. Novartis plans to invest $23 billion in its US plants, while Roche is talking about $50 billion. At the same time, Roche is preparing for various scenarios but is confident that it will be able to cushion the impact of the tariffs: "We are actively shifting inventories to the US and significantly ramping up production," a company spokeswoman said in response to a query. "In fact, we have increased our production capacity in the US six to sevenfold in recent years and, with 50% of our capacity currently unused, we can further increase production." In addition, the company is in talks with the US government and continues to advocate for political measures.

Roche has more than 25,000 employees in the US. According to the company, it has 15 research and development sites and 13 production sites in its two divisions, Pharmaceuticals and Diagnostics.

Rentschler takes threat seriously

German contract manufacturer (CDMO) Rentschler takes the VFA's assessment "very seriously," according to which tariffs on pharmaceuticals could jeopardize global supply and weaken Germany as a center of innovation. "This break with decades of duty-free trade in medicines means significant additional costs for manufacturers and sends a critical signal at a time of global health crises," said a spokeswoman. "At the same time, the current situation shows how important regional production diversity and resilient supply chains are. Our dual presence in Europe and the US allows us to respond flexibly to regulatory changes and provide reliable support to our customers worldwide. We also see that pressure on the affordability of medicines is growing."

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"What may mean predictability for many industries is a strategic burden for European manufacturers in the pharmaceutical sector."

Dorothee Brakmann, CEO of Pharma Deutschland

As a CDMO, Rentschler develops and manufactures biopharmaceutical active ingredients and medicines on behalf of its customers at its sites in Laupheim (Germany) and Milford (US).

Novo Nordisk in the US for 40 years

The Danish pharmaceutical company Novo Nordisk is also affected by the tariffs, even though the company has been operating in the United States for over 40 years and employs more than 10,000 people at 12 locations for production, research, and development. A spokeswoman emphasizes that the company has invested over US$24 billion in the US in the last ten years alone. A significant proportion of the products sold in the US are also produced there—just as US President Trump wants.

Bayer Aims to Stabilize Supply Chain

The Leverkusen-based Bayer Group also has a presence in the US with its Pharmaceuticals division. The company manufactures pharmaceuticals in Berkeley, California, and at three sites in Pennsylvania: O'Hara, Indianola, and Saxonburg. Upon request, the company stated that it is continuously monitoring the "numerous customs announcements." "Our experts are analyzing the potential impact and developing possible solutions to ensure delivery to our customers. We are focusing on stabilizing our supply chains and minimizing any potential impact."

Boehringer Ingelheim: Signs of Cooperation

Following US President Trump's call for lower drug prices, Boehringer Ingelheim has signaled its willingness to cooperate: "We will continue to work constructively with governments, regulatory authorities, and patient organizations to ensure that patients have access to affordable medicines and that medical innovations for vital treatments remain possible."

The Darmstadt, Germany-based life sciences company Merck is taking a cautious approach. It says it was necessary to conclude a trade agreement between the EU and the US because companies need reliable framework conditions. It will now examine the impact of the agreement on its own business.

Appeals from Pharmaceutical Associations

In view of the customs deal and Donald Trump's erratic policies, pharmaceutical associations have little choice but to issue appeals and general recommendations. VFA President Steutel warns: "The EU must take urgent countermeasures to secure the location and supply." And: "We must now urgently do our homework for Germany as an industrial location."

Pharma Deutschland, in turn, calls on the German government and the EU Commission to initiate "compensatory measures." Production in Europe must be strengthened, targeted investment incentives created, and a trade policy developed that ensures both security of supply and the competitiveness of the industrial location.

And the BPI warns: "It is crucial for medical care that drugs, medical devices, combination products, veterinary drugs, and veterinary medical technology products do not become pawns in trade conflicts," says Chairman Kirst.

Scienceindustries, a Swiss business association for Chemistry, Pharma and Life Sciences, calls on the authorities to continue their diplomatic efforts and to press for the measures to be withdrawn or mitigated. The imposed tariffs of 39% "aren't neither justified nor comprehensible from an economic or security policy perspective—especially when compared to the significantly lower tariffs imposed on the EU (15%) and the United Kingdom (10%). The disproportionately high tariffs pose massive challenges for Swiss companies. They make exports more expensive, undermine competitiveness in the international market and dampen the investment climate. This is a serious burden for many export companies in Switzerland's chemical, pharmaceutical and life sciences industries".

Thorsten Schüller, CHEManager

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The Greater Boston Area is one of the world's leading biotech and pharmaceutical centers and also offers a number of strategic advantages for European pharmaceutical companies.

Advanced Intermediates in Pharmaceutical Production

How the Right Partner Can Help Navigate a Challenging Environment

The pharmaceutical industry is evolving due to new regulations and technological developments. Distributors like Biesterfeld play a central role in supporting manufacturers in their daily operations. With their in-depth market knowledge, quality and regulatory expertise, and pan-European logistics and supply chain network, they are major contributors to future success in a competitive global economy.

Competence in Solutions

Advanced intermediates are key building blocks in the pharmaceutical manufacturing process. These complex chemical compounds are produced during the early or mid-stages of drug synthesis and are essential for creating active pharmaceutical ingredients (APIs). By streamlining the production process and ensuring consistent quality, advanced intermediates are vital for improving efficiency, reducing costs, and meeting regulatory standards in drug development and large-scale manufacturing.

With more than 100 years of international expertise, Biesterfeld is one of the leading distributors of specialty chemicals worldwide. Advanced Intermediates is one of four segments — alongside Pharma, Medical, and Animal Health — within the global HealthCare Business Unit.

"Currently, we offer more than 180 registered fine chemicals and advanced intermediates in our portfolio. This includes pyridines and piperidines, ketene derivatives, phase-transfer catalysts, fluorine compounds, and others, as well as customer-specific products for a wide range of applications and market segments," says Fritjof Weidner, Business Manager Advanced Intermediates at Biesterfeld. "With our close relationships with innovative partners, a strongly expanded presence in Asia, and our market expertise and knowledge, we can meet current market demands with our flexible product portfolio — which we are able to customize whenever required."

Partnering with a REACh-Compliant Distributor

Biesterfeld focuses on complex and highly specialized chemical substances. Thanks to in-depth knowledge of customer requirements, Biesterfeld can supply the right product — with the quality, packaging, and delivery time demanded by each specific application.

An experienced distributor functions as a reliable partner, serving its customers along the entire value chain through a well-developed international sales and logistics network. This includes full transparency, compliance, and regulatory support — such as REACh.

REACh (Registration, Evaluation, Authorisation and Restriction of Chemicals) is a key regulation in the European Union, aimed at ensuring the safe use of chemicals in the pharmaceutical industry. A REACh-compliant distributor helps pharmaceutical manufacturers stay legally compliant, maintain supply chain integrity, and secure market access within the EU. This is critical given the strict regulatory environment in pharmaceuticals and the potential consequences of non-compliance.

Securing the Future with the Right Partner Network – Biesterfeld is by Your Side

A strong network of experienced players in the pharmaceutical sector is essential for a successful and sustainable setup in this demanding industry. An experienced distributor can act as a link between manufacturers, regulatory authorities, and healthcare providers, supporting the entire process from purchasing to delivery.

A partner like Biesterfeld stands by its customers' side with a team of specialized product and marketing experts, quality and regulatory managers, and local sales representatives in all key markets worldwide.

Visit us at CPhI in Frankfurt, October 28–30, at Booth 8OS64, and let's discuss how Biesterfeld can support you best!

Your Distribution Partner for Advanced Intermediates

Biesterfeld
Competence in Solutions

Customizing Stability: Strategies for Partners in the Life Sciences Industry

From breakthrough innovations and the rise of personalized medicine to the lasting impact of the COVID-19 pandemic, the forces reshaping pharma are both powerful and unpredictable. The surge in investment during the pandemic has given way to a sustained industry correction—marked by reduced funding due to high interest rates, pipeline rationalization, and widespread layoffs across biotech and mid-to-large pharma. Supply chains, once optimized for cost, have been exposed as vulnerable. At the same time, regulations are tightening, and sustainability is becoming a baseline expectation. The pressure to deliver life-saving therapies reliably and affordably has never been greater. For Evonik, a trusted partner to the pharmaceutical industry, resilience is more than a concept—it's a guiding principle. In this interview, Lauren Kjeldsen, Chief Operation Officer Custom Solutions, shares how the company is rising to meet these challenges.

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Lauren Kjeldsen, Chief Operation Officer Custom Solutions, Evonik

CHEManager: What key trends do you see shaping the stability and future direction of the global pharma market in the coming years?

Lauren Kjeldsen: We're seeing a convergence of major forces that are reshaping the pharmaceutical landscape—and they're happening all at once. Innovation in new drug modalities like nucleic acids and even personalized medicine are driving a transformation in the industry. These innovative solutions demand highly tailored formulation and functional delivery systems, which is why Evonik is investing in advanced drug delivery technologies, including nucleic acid delivery platforms.

> *"Resilience isn't built overnight—it's the result of intentional investment, strong collaboration, and a clear strategic direction."*

Another trend that can no longer be ignored is sustainability. Green chemistry, carbon emissions reduction, and circular production models are becoming foundational to how pharma companies operate. Customers are asking us how we can help them reduce their footprint—and here we are well-positioned to work with them across the entire value chain because sustainability is core to our strategy at Evonik.

Digitalization is also accelerating across the industry. AI and data-driven tools are transforming everything from drug discovery to supply chain optimization. These technologies are helping us improve forecasting, reduce waste, and respond more quickly to market shifts. It's about building smarter, more agile systems that can adapt in real time.

Finally, there's a growing need to balance global reach with regional resilience. The pandemic and geopolitical tensions have shown us the risks of over-reliance on single regions.

How does your organization balance the need for agility and innovation with regulatory compliance and cost pressures in today's volatile environment?

L. Kjeldsen: Our strategy for our life sciences businesses is built around science-based innovation, customer-centric business models, and operational agility. One great example is the way we leveraged our agility, knowledge and assets during the COVID-19 pandemic to ramp up the production of lipids needed for mRNA vaccines in record time. I am convinced that our approach of building synergies within our diverse business enables us to address challenges as they evolve.

We work closely with customers in countries all over the world and having facilities located across Europe, the U.S. and Asia allows us to respond quickly, tailor solutions, and build long-term partnerships rooted in trust and performance. This is also true for regulatory support—our customers benefit from a global regulatory network that helps them navigate complex compliance requirements.

> *"Sustainability is fully integrated into Evonik's strategy and is an integral part of our purpose—to improve life, today and tomorrow."*

What strategic initiatives or partnerships are you prioritizing to ensure resilience and long-term success amid ongoing industry uncertainty?

L. Kjeldsen: In partnership with the pharmaceutical industry, we're driving innovation across key areas such as drug delivery technologies, bioresorbable excipients, pharmaceutical lipids, and advanced solutions for biopharmaceutical manufacturing. Central to this progress is our focus on precision biosolutions, which serve as a major growth driver and a cornerstone of our strategy.

We're also prioritizing regional balance by aligning our production networks to support local-for-local manufacturing. This is especially critical in the U.S., where reshoring efforts are gaining momentum.

www.evonik.com

EVONIK
Leading Beyond Chemistry

Resilience in a World of Uncertainty

The Future of the Pharmaceutical Supply Chain

In today's rapidly changing global landscape, the pharmaceutical industry faces unprecedented challenges. From pandemics to geopolitical instability, the supply chain is constantly under threat. The concept of VUCA—volatility, uncertainty, complexity, and ambiguity—aptly describes this environment. To thrive, companies must build resilient supply chains that can adapt to disruptions.

Understanding VUCA in Pharmaceuticals

VUCA represents:

- **Volatility:** Sudden and unpredictable changes in supply and demand.
- **Uncertainty:** Unpredictable future events.
- **Complexity:** Interconnected global supply chains.
- **Ambiguity:** Incomplete or conflicting information.

Four Pillars of Resilience

Recent pressures on global supply chains—rising pharmaceutical demand, the COVID-19 pandemic, and stricter regulations—have exposed vulnerabilities, highlighting the need for agility and adaptability. A resilient supply chain relies on four essential pillars: visibility, flexibility, collaboration, and control & transparency, ensuring stability amidst uncertainty.

- **Visibility**

Real-time supply chain visibility allows companies to detect and address issues early, preventing crises. By monitoring activities from sourcing to delivery, companies can quickly identify disruptions and minimize negative impacts.

- **Flexibility**

Supply chain management must be flexible to adapt to disturbances. This involves having contingency plans, such as alternative supplies or production sites, to quickly adjust operations based on current conditions.

- **Collaboration**

Collaboration with internal and external partners boosts supply chain resilience. Cooperation among suppliers, manufacturers, and stakeholders ensures an effective response to disturbances.

- **Control & Transparency**

Transparent control of the supply chain builds trust. Clear communication, data management, and regulatory compliance prevent disruptions and maintain integrity.

Bachem's Approach to Building a Resilient Supply Chain

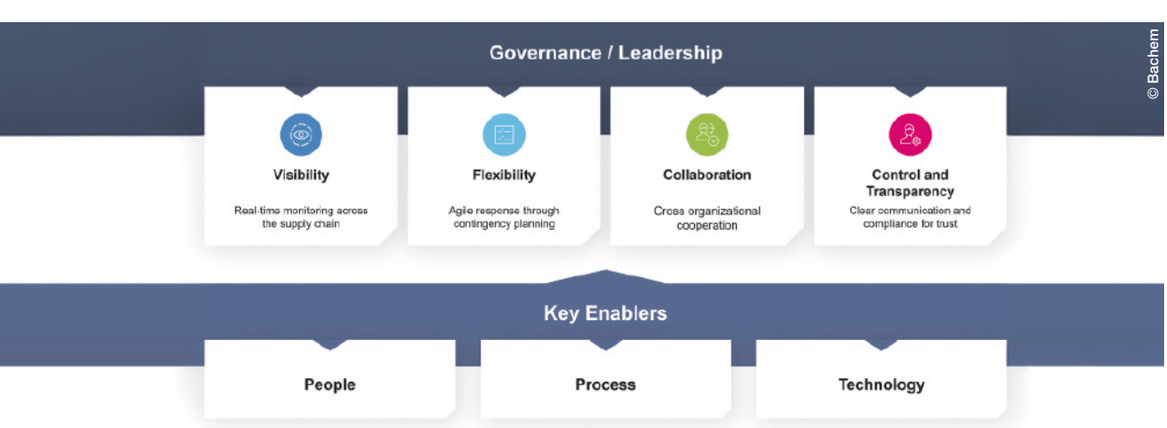
At Bachem, our approach to a secure and robust supply chain is firmly grounded on these four pillars, ensuring we thrive in the VUCA-prone world of pharmaceutical manufacturing. Our global enterprise resource planning (ERP) system provides real-time insights across operations, enabling compliance with country-specific regulations and early risk management. Continuous monitoring allows us to make timely, informed decisions.

Vertical integration is key to Bachem's supply chain security. Our in-house manufacturing, combined with close collaboration with long-term suppliers, ensures tighter quality control, faster responses to demand fluctuations, continuous supply of critical materials, and reduced dependence on third-party suppliers. This strengthens our adaptability and ensures continuity in an unpredictable environment.

Internal collaboration is central to our resilience. Cross-functional teams connect procurement and distribution, creating a seamless, responsive supply chain. This integrated setup increases efficiency and agility, ensuring the delivery of high-quality pharmaceutical products worldwide.

Partner with Bachem for Reliable API Supply

In a world where supply chain resilience is critical, Bachem stands out as a trusted partner. Our proven expertise in Peptide and Oligonucleotide API manufacturing, combined with our robust infrastructure and commitment to quality, ensures a reliable and secure supply of the molecules that drive therapeutic innovation. Collaborate with us to safeguard your pharmaceutical pipeline and navigate uncertainty with confidence.



BACHEM

Boosting Pharma Efficiency

Performance Improvement in Pharmaceuticals Operations

The pharmaceutical industry has faced significant margin pressure due to rising energy costs, inflation, and geopolitical tensions. Companies have implemented various performance improvement programs to stabilize or boost margins. Moving forward, a more sophisticated approach is necessary to address these ongoing challenges.

Margin pressures are expected to persist, driven by factors like restricted access to capital, localization of supply chains, complex network setups, new tariffs, price pressure in the US market, and intensified regulation. Biotech and small molecule companies have faced these challenges since 2019, while CDMOs saw similar impacts only recently. To navigate these challenges, companies must restructure value chains, optimize key processes, and ensure effective business alignments.

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"Historically, firms have pursued top-line growth initiatives; now, their focus is shifting to bottom-line improvements."

Daniel Wothe, Partner for Pharma and MedTech, PolarixPartner

Historically, firms have pursued top-line growth initiatives; now, their focus is shifting to bottom-line improvements. Progress has been made in cutting SG&A expenses, yet further reductions are limited. R&D cuts have occurred due to funding restrictions, particularly in cell and gene therapy, but major companies are cautious not to undermine future growth.

Supply reliability remains a priority, leading to increased inventory levels to buffer against supply chain disruptions. Over eight years, days inventory outstanding (DIO) has risen by nearly 30 percent, despite recent improvements. Ensuring a harmonized and integrated value chain from R&D to global drug supply, with a focus on digitalization and transparency, is crucial.

Operational Improvements in Pharmaceuticals

Companies therefore increasingly focus on bottom-line improvements, cuts to SG&A expenses and R&D investments. However, they must balance cost savings with maintaining future growth potential. Supply reliability remains a priority, leading to increased inventory levels as a buffer against disruptions.

Strategic Levers for Sustainable Cost Savings

To achieve lasting cost reductions, four principal strategies are recommended:

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"Creating an agile organization that responds to market demands through established processes is vital."

Michael Baur, Partner Health – Life Science Transformation, Roland Berger

Network and Value Chain Optimization

Pharma companies must redesign networks by defining clear roles for launch, core, and specialty sites, and by reducing redundant technologies. For instance, a major pharmaceutical company recently streamlined its operations by consolidating production sites and focusing each site on specific stages of the drug development process. Strategic partnerships with CDMOs (Contract Development and Manufacturing Organizations) can further enhance efficiency by leveraging external expertise. For example, the biotech firm Viking Therapeutics partnered with Corden Pharma to expedite the scale-up of its vaccine production, resulting in a substantial reduction in time-to-market. Simplifying operations and balancing risk mitigation with cost optimization are crucial to maintaining competitive advantage.

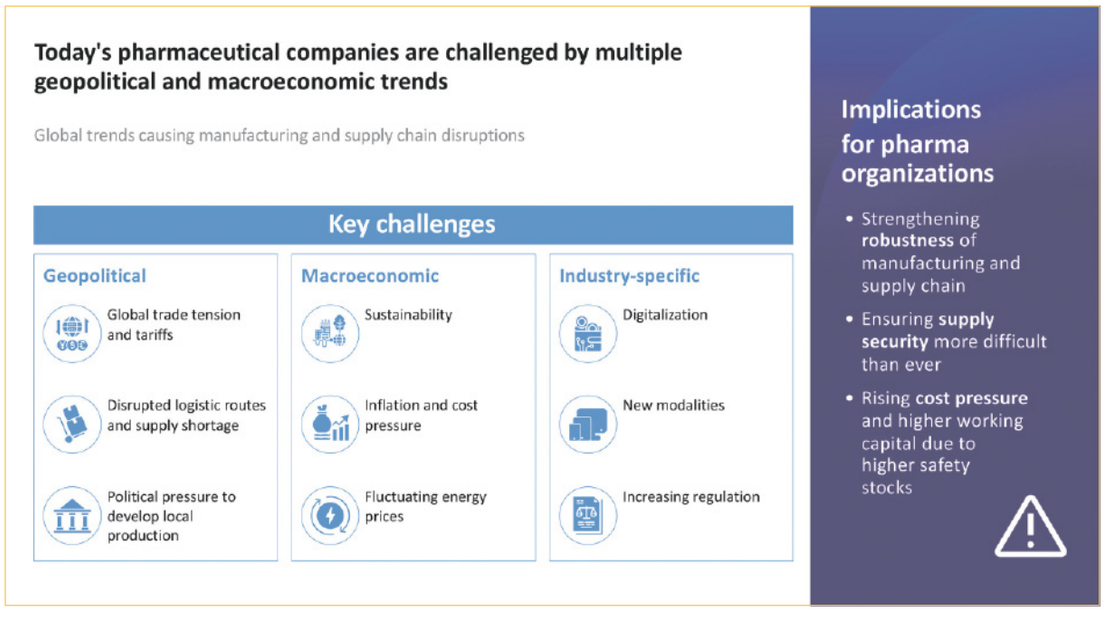

Fig. 1: Global trends causing manufacturing and supply chain disruptions

OPEX 2.0: Operational Excellence through Digitalization

Increasing overall equipment effectiveness (OEE) and enhancing end-to-end processes are crucial. Automation, quality assurance, and reducing manual steps significantly improve efficiency. For example, Swiss multinational Roche increased forecast accuracy by implementing machine-learning algorithms.

Adopting technologies like virtual digital twins, which simulate process changes and support training, and smart machine learning can further optimize operations. The pharma industry must embrace digitalization to achieve process excellence. Digital tools enhance operational efficiency, reduce errors, and boost productivity. MSD exemplifies this by using data

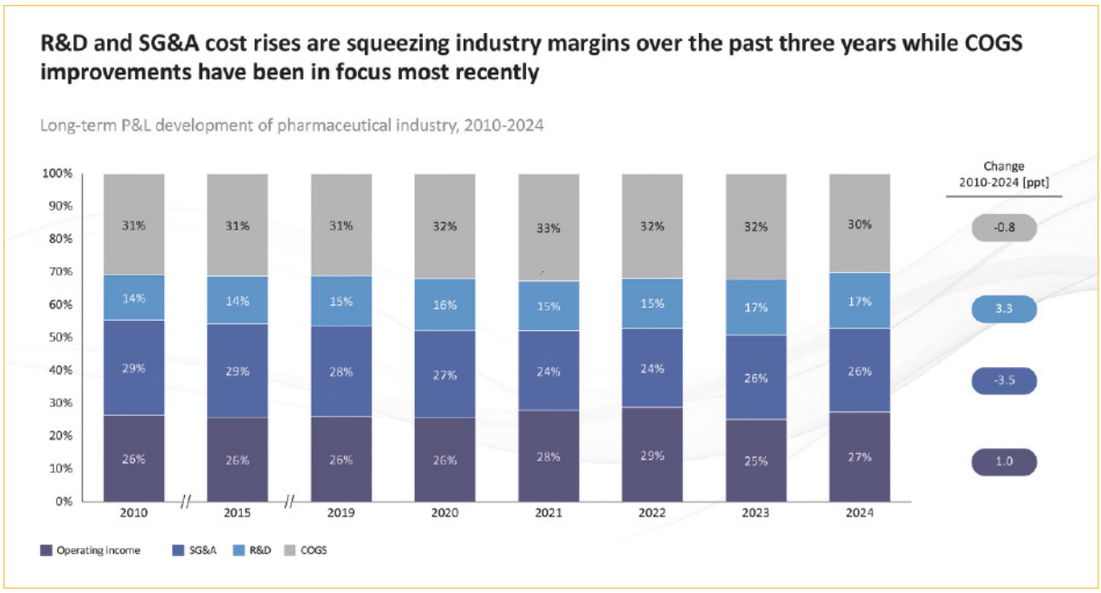

Fig. 2: Long-term P&L development of pharmaceutical industry, 2010-2024

analytics, generative AI, 3D printing, and digital twins at its new vaccine facility in Durham, USA.

AI—A Key Differentiator

Artificial intelligence (AI) drives efficiency by enabling predictive analysis, optimizing production, and developing strong supply chain strategies for a competitive edge. Machine-level data transparency is crucial in manufacturing. Using AI in supply chain management enhances efficiency and responsiveness, supporting compliance in regulatory affairs.

For example, GSK is investing up to $800 million to upgrade its Pennsylvania site with advanced digital and AI technologies, improving operational agility, supply chain resilience, and speeding up the production of medicines and vaccines. Roche uses AI for visual quality control and inspection, improving yield, reducing costs by 50%, and establishing real-time monitoring processes.

Adapted Organizational and Governance Frameworks

Adapting organizational structures and governance frameworks to dynamic markets is crucial. This involves fostering a culture of agility, improvement, and responsiveness to market changes. Clear roles and responsibilities between Operations and adjacent functions prevent conflicting steering models, streamline operations, and ensure accountability. Strengthening connections between Operations and R&D helps optimize Chemistry, Manufacturing, and Controls (CMC) issues and address upscaling early, especially in Cell and Gene Therapy (CGT), Biopharma, and peptide manufacturing.

Creating an agile organization that responds to market demands through established processes is vital. Continuous improvement and a responsive culture are essential for adapting to changes. Organizations implementing these priorities navigate pharmaceutical complexities effectively, ensuring performance and compliance.

Sanofi exemplifies successful implementation by integrating AI across its global operations. The launch of an internal app supports functions from Manufacturing to Development, Engineering, and Finance. This digital assistant leverages generative AI (GenAI) to streamline workflows, enable faster decisions, and improve efficiency, reducing product development to production time from three months to just 12 days.

The Future of Pharmaceuticals Operations

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"Through network optimization, process excellence, AI innovations, and adaptive governance, companies can achieve sustainable cost savings and maintain a competitive edge."

Stephan Fath, Director Health - Life Science Operations, Roland Berger

Operations will play a crucial role in ensuring industry resilience and success. Embedding Operations in R&D discussions and portfolio planning can drive innovation and efficiency. Strategic planning and operational expertise are essential for upscaling processes and ensuring supply reliability. Collaborating with policymakers and institutional bodies can establish supply security mechanisms for critical medicines.

Addressing strategic imperatives in operational efficiency and cost optimization is vital for the pharmaceutical industry. Through network optimization, process excellence, AI innovations, and adaptive governance, companies can achieve sustainable cost savings and maintain a competitive edge. These priorities will be instrumental in driving performance improvement and ensuring long-term success.

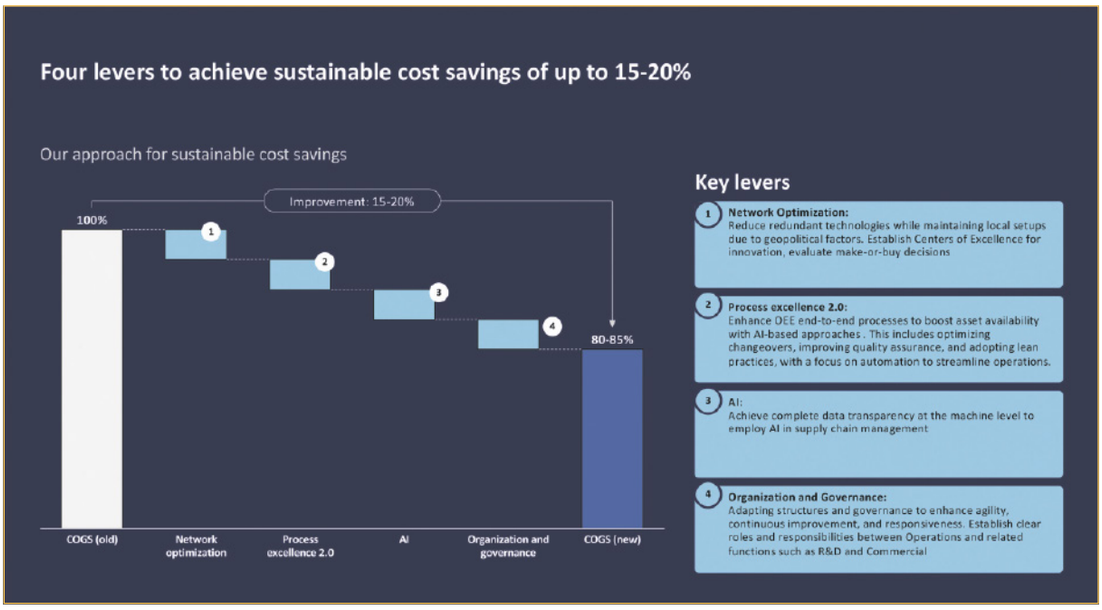

Fig. 3: Approach for sustainable cost savings

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Back to Basics for Chemical Suppliers

Buyers Will Pay for What Matters Most

Chemical customers are willing to pay a premium if their product and service needs are fully met, presenting an opportunity for suppliers to strengthen relationships and generate new value. The key lies in focusing on top customer priorities. By aligning with these needs and leveraging digital tools, chemical companies can differentiate themselves and drive growth in a challenging environment.

In a market where growth is hard-won and differentiation is key, an insight from a recent report, published by Accenture, offers a promising path forward: 43% of chemical customers say they would buy 10% or more products and services—and 36% would pay at least 5% above market price—if their needs were fully met. This finding highlights a powerful opportunity for chemical companies to strengthen customer relationships and generate new value through operational excellence.

The message from buyers is clear: do less, but do it better.

A Strategic Reset in Customer Expectations

Historically, chemical companies have emphasized innovation and tailored solutions to meet diverse customer needs. But today's buyers are asking for something different. According to our global buyer value research, the top three customer needs in 2025 are not groundbreaking features or bespoke formulations—they are the "brilliant basics": product performance, reliable delivery and quality technical support.

The message from buyers is clear: do less, but do it better.

This marks a significant departure from 2020, when easy access to product information and product innovation ranked higher. The shift reflects a broader recalibration of expectations in the wake of pandemic-era disruptions, geopolitical instability and rising digital maturity across industries. Notably, product performance remains the top customer need, underscoring its enduring importance.

The Cost of Misalignment

Despite the clarity of customer priorities, chemical companies continue to misjudge what matters most. The report reveals a growing gap between the needs customers see as top priorities and what suppliers believe is important. In 2020, chemical companies *overestimating* customer needs mostly drove this gap. In 2025, *underestimating* customer needs primarily drives the gap.

For example, suppliers most significantly underestimate 24/7 access to support and information. The gap between how they and buyers rate it in importance has increased by 36 percentage points since 2020. Similarly, reliable delivery and product consistency—both critical to customer satisfaction—remain underrated by chemical companies. Notably, two of these three most underestimated attributes are service-related.

This misalignment has real consequences. Overestimating needs—such as the top three overestimated by suppliers in 2025: renewable-based products, market intelligence and product customization—often results in wasted resources. Underestimating attributes means missing out on opportunities to differentiate and grow. (See Fig. 1.)

Convergence Enables Simplicity at Scale

One of the most promising findings from the research is the convergence of needs across customer industries. Buyers across 13 sectors, including automotive, agriculture and electronics, consistently rank product performance among their top-five needs. Reliable delivery is also a top-five priority in 92% of industries, and quality technical support makes the list in 54%. This growing consistency enables chemical companies to streamline their offerings and scale solutions across sectors.

For example, investing in available-to-promise capabilities, which determine how much inventory is available for processing a customer order, or integrating production scheduling with transport management and tracking can help meet the delivery expectations of multiple customer segments simultaneously.

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Bernd Elser, Accenture

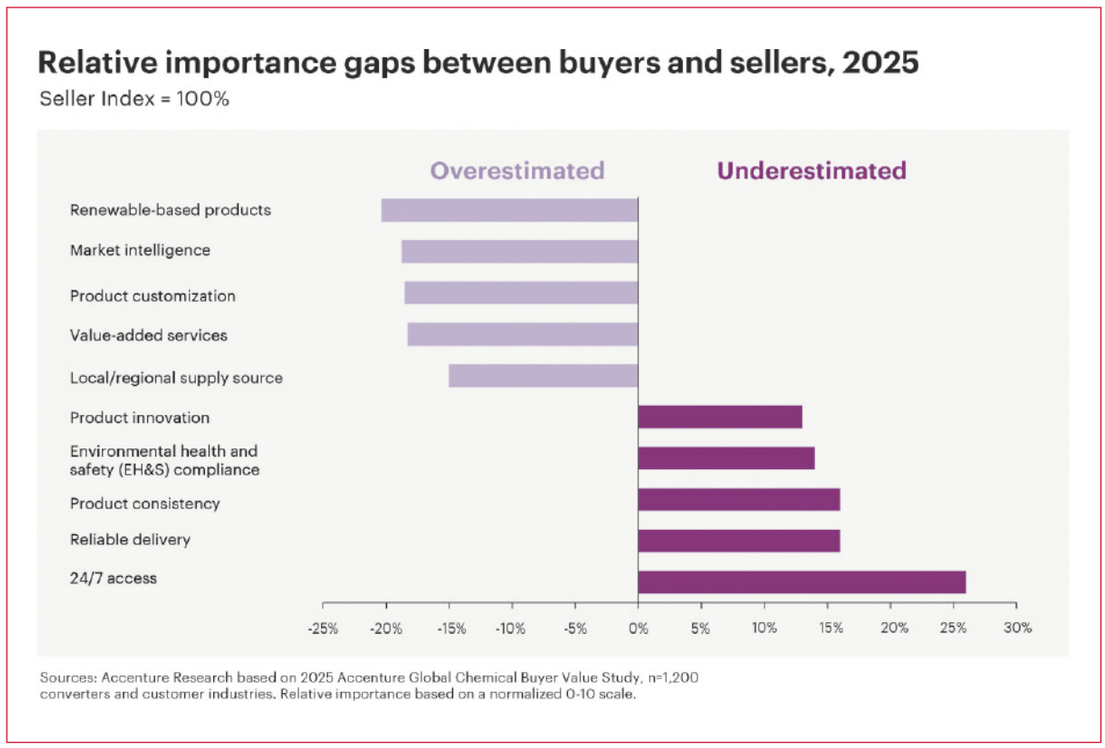

Fig. 1: Top under- and overestimated customer needs by chemical companies in 2025.

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Service: A New Frontier

While product quality remains paramount, service is emerging as a key differentiator. Our research shows that customers rate 90% of their top 10 service needs as highly important, compared to only 50% of their top product-related needs. By improving their service offerings, chemical companies can set themselves apart.

Many of these top service needs aren't tied to individual products—think reliable delivery, robust data privacy and cybersecurity, seamless transactions and 24/7 access. That means chemical companies can build enterprise-level capabilities that can span their portfolio. By investing in scalable service platforms, suppliers can better meet customer expectations, improve efficiency and stand out in a competitive market.

Doing It Better: The Role of Digital and AI

To meet rising customer expectations, chemical companies must also raise the bar on performance—and digital tools are key to making that possible. Generative AI and other advanced technologies are enabling new capabilities, from AI-based planning and dynamic scenario modeling to real-time data integration that improves transparency from the plant gate to the customer's gate. These tools also enhance technical support, with AI-powered portals offering 24/7 access to product specifications, lab data and troubleshooting guidance.

Such capabilities are no longer optional. They are the foundation for delivering the brilliant basics at scale—and for building the resilience needed to navigate an increasingly volatile economic and geopolitical environment.

Focus, Align, Deliver

The path forward is not about doing more. It's about doing what matters—exceptionally well. By focusing on the needs that customers prioritize the most, aligning internal resources accordingly and using digital tools to improve performance, chemical companies can create new growth in a challenging market.

The future belongs to those who simplify with purpose, serve with precision and innovate where it counts.

Bernd Elser, Senior Managing Director, Global Chemicals & Natural Resources Lead, Accenture, Frankfurt/Main, Germany

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Driving Change Across the Industry

Empowering Women in Plastics

In the lead-up to K 2025, the world's premier trade fair for the plastics and rubber industry, Christene Smith from CHEManager speaks with Christine Bunte, Managing Director of Plastics Europe Germany, and Miriam Olivi, President of Women in Plastics Italy. Both leaders are actively supporting the "Women in Plastics" initiative, which will be featured at this year's event. In this exclusive interview, Bunte and Olivi discuss the strategies and programs their organizations have implemented to advance diversity and inclusion, share their perspectives on empowering women in the plastics sector, and highlight the collaborations and innovations shaping the industry's future. Their insights set the stage for an important conversation on leadership, opportunity, and progress in plastics.

CHEManager: What inspired you to pursue a career in the plastics industry, and what key moments or mentors have shaped your professional journey so far?

Miriam Olivi: I was drawn to the plastics industry early in my career, fascinated by its pivotal role in enabling countless innovations and by its global dimension. My professional journey began in a back-office sales role and over time I embraced positions of increasing responsibility, which allowed me to develop both technical and managerial skills.

Key moments include my appointment as General Manager at Frigosystem, which challenged me to lead transformation and international growth. I was fortunate to have mentors who believed in my potential and supported my ambitions, even when the industry was less open to female leadership than it is today. Their trust taught me the importance of empowering others and inspired me to dedicate part of my work to building opportunities for women. I am deeply honored to serve as the first President of Women in Plastics Italy, an association dedicated to empowering women and promoting sustainability within the plastics industry. This role is especially meaningful to me, as it allows me to set an example for other women and for the next generations, encouraging them to believe in the opportunities this sector has to offer.

Christine Bunte: Since my advanced studies in chemistry, I have been fascinated by the versatility of plastics—whether in everyday applications like IT, transportation, and food hygiene, or in cutting-edge innovations. During my PhD, I worked on electroactive polymers for biofuel cells that convert oxygen and glucose in the human body into energy. That really showed me the tremendous possibilities of polymers and plastics for a more sustainable future and higher quality of life.

One of the most influential figures in my career was a female leader in my previous organization. When I met her, I was at a point in my career where I wanted to explore a new area of working, one that combined technical expertise with communication skills. That was not a straightforward transition and I met a number of obstacles—her encouragement really helped me to stick to my idea nonetheless. This has ultimately led me to the position I am in today.

How do you see the role of women evolving in the plastics sector, and what progress or challenges have you observed regarding diversity, inclusion, and leadership opportunities?

C. Bunte: The plastics industry is still quite traditional. While diversity is improving, gender balance remains a challenge. That's a missed opportunity, particularly in times of skilled labor shortages. We're essentially overlooking the potential of half the population!

Part of the issue lies in the technical nature of the field. As a mother to a three-year-old daughter, I am convinced that the reason for women often turn away from technical jobs is not nature, but nurture. From an early age, children's behavior is categorized as "typical for a boy" or "typical for a girl". Studies even show that people hold babies differently depending on the gender they believe the child has.

I truly believe that the biggest barrier to gender equality—whether in plastics or any other sector—is our mindset. If we become aware of our assumptions and expose all children to a wide range of skills, hobbies, and professions, we'll discover where their true interests lie and have more men work in daycare, and more women in engineering.

M. Olivi: The role of women in the plastics industry is gradually evolving, but progress remains uneven across countries and company cultures. More women are entering technical and managerial roles, and there is a growing recognition of the value of diverse perspectives in decision-making.

However, challenges persist: stereotypes about the—masculine—nature of industrial environments, gender gaps in leadership positions, and limited access to mentoring networks. One positive trend I observe is that discussions about diversity are becoming more concrete, shifting from awareness to actionable strategies. But there is still much to do to normalize female presence and leadership in all areas of the sector.

Can you share specific strategies or programs your organization has

> *"I was fortunate to have mentors who believed in my potential and supported my ambitions, even when the industry was less open to female leadership than it is today. Their trust taught me the importance of empowering others and inspired me to dedicate part of my work to building opportunities for women."*
>
> Miriam Olivi, President of Women in Plastics Italy

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Christine Bunte, Managing Director, Plastics Europe Germany

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Miriam Olivi, President, Women in Plastics Italy

implemented to support and promote women's leadership and professional development in the plastics industry?

M. Olivi: Women in Plastics Italy was founded to create a platform dedicated to supporting women's professional growth, amplifying their voices, and fostering inclusivity. Among our first initiatives, we have established a collaborative network connecting women across companies and roles, offering opportunities for mutual support and knowledge exchange.

We organize events, workshops, and mentoring programs that aim to develop both technical skills and leadership capabilities. Additionally, we engage with institutions and industry associations to advocate for policies that promote gender equality, and we encourage our members to participate at national and international events, increasing the visibility of female talent in our industry. We also cooperate with universities to attract female talent in STEM fields and to guide them as they explore and enter this exciting industry.

C. Bunte: During my time at BASF, I participated in several mentoring and networking programs—some specifically for women, others open to all employees. I've been both a mentee and a mentor, and I can say with confidence that both roles are incredibly rewarding. One of my former mentees was a young post-doc looking for her first job. When we spoke first, she was really in the orientation phase. I tried to both encourage her and also make concrete suggestions about avenues which she might want to test. When we spoke next time, she held a contract! What made my day was when she confined that our previous conversation had really helped her to be bold in where she applied to, and do so with confidence.

In both my previous and current roles, I've found that the most powerful lever is having an open mindset—especially when it comes to women taking on leadership roles after becoming mothers. There's still a lingering bias that mothers should focus more on family and are less available for professional challenges. But to me, leadership potential has nothing to do with family status.

Lastly, I've often received feedback from other women who say it's encouraging to see someone in a leadership role with a young child.

> *"By combining policy, education, and cultural change, we can ensure lasting progress and a stronger, more innovative industry."*
>
> Miriam Olivi, President of Women in Plastics Italy

What innovative ideas or collaborations are you most excited about for empowering women in the plastics industry—either within your organization or across the sector?

C. Bunte: For me, the three biggest game changers are mindset, childcare, and education.

We've already touched on mindset, but it's worth adding that true equality also means normalizing fathers taking on equal responsibility at home—whether it's during parental leave, when children are sick, or in managing everyday family life.

Childcare is a straightforward yet often underperforming area. Without reliable daycare options, many parents are forced to scale back their careers. Unfortunately, today these are usually the women.

As for education, we need to start early. Young children should be introduced to technical tasks that build skills in design and engineering. Initiatives like—Girls' Day—are great, but they often come too late. They try to undo years of conditioning in a single day or week. We need to be proactive, not reactive.

> *"One positive trend I observe is that discussions about diversity are becoming more concrete, shifting from awareness to actionable strategies."*
>
> Christine Bunte, Managing Director of Plastics Europe Germany

What excites me most are growing collaboration initiatives among women in the industry. Whether in Germany, Italy, or in the US, we're seeing more women connect, share strategies, and support one another. These networks are inspiring and providing the role models we urgently need.

M. Olivi: I am especially excited about cross-company and cross-country collaborations that unite women—and allies—in sharing best practices and resources. Initiatives like the upcoming—Women in Plastics—event at K 2025 are prime examples: they create an international stage for dialogue, networking, and concrete projects.

Within our organization, we are working on digital tools to facilitate mentorship matching and access to training for members across Italy, regardless of location. I also see great potential in partnerships with educational institutions to inspire young women to consider careers in plastics, and with companies ready to pilot inclusive workplace policies. These collaborations can accelerate systemic change far beyond what any single organization could achieve alone.

Looking to the future, what are your hopes and predictions for the next generation of women in the plastics industry, and what steps do you believe are most important to achieve lasting progress?

M. Olivi: I hope the next generation of women will enter a plastics industry where gender equality is the norm rather than the exception, where they can aspire to any role without barriers or stereotypes limiting their ambitions.

To achieve this, it is crucial to integrate diversity and inclusion into corporate strategies as core values, not optional add-ons. Companies must set measurable goals, create transparent career pathways, and invest in leadership training for women.

Equally important is building a culture that celebrates diversity of thought, where women's contributions are recognized and valued at every level. By combining policy, education, and cultural change, we can ensure lasting progress and a stronger, more innovative industry.

C. Bunte: Women have come a long way, as we will see at this year´s—Women in Plastics—event where successful, high-ranking and inspiring females will get together for an evening of impulses and networking. There is reason to celebrate!

> *"I truly believe that the biggest barrier to gender equality—whether in plastics or any other sector—is our mindset. If we become aware of our assumptions and expose all children to a wide range of skills, hobbies, and professions, we'll discover where their true interests lie and have more men work in daycare, and more women in engineering."*
>
> Christine Bunte, Managing Director of Plastics Europe Germany

My hope and conviction is that the next generation will build on the basis which has been achieved already and take bold steps forward towards true gender equality.

I am convinced that plastics can become a highly attractive sector for young people of any gender as their unmatched abilities to improve our quality of life and help us to protect our climate and planet. We can show young people that they are not only making a living but literally build our future—what better motivation could we offer them?

- plasticseurope.org
- www.k-online.com

For the Challenges of E-Mobility and Sustainability

High-Performance Additives 'Tune' Thermoplastics

Advanced additives for engineering plastics allow compounders to produce materials with properties that significantly exceed previous performance limits. Such benchmarks are in demand among original equipment manufacturers (OEMs) and suppliers as they face new challenges. The keywords here are e-mobility, the continuous search for greater sustainability through material and energy savings, and the recycling of plastics for reuse.

One focus is on metal- and halogen-free additives that significantly increase thermal resistance while maintaining electrical and flame-retardant properties, and additives that thermally and mechanically enhance recycled materials to the level of virgin materials. Another focus area is the improvement of flow properties during injection molding of thermoplastics. This enables long flow paths even for complex shapes with low wall thickness for lightweight designs, particularly when high percentages of reinforcing fibers are used to maximize mechanical strength. At the K 2025 trade fair in Düsseldorf, German manufacturer of high-performance additives Brüggemann will showcase what is already possible today. This article provides first insights.

The company's portfolio of additives was complemented in 2022 with the acquisition of the Italian subsidiary Auserpolimeri, which is now fully integrated. Brüggemann is a leader in the design and supply of high-performance additives for all types of polyamides. Auserpolimeri's expertise adds to Brüggemann's sophisticated solutions in the field of chemically functionalized polyolefin-based polymers, which are used as impact modifiers, particularly for polyamides. In addition, there are new developments, including an additive that provides thermoset-like properties, particularly at high temperatures, without compromising the thermoplastic processability for applications such as polyolefin foams, halogen-free flame-retardant (HFFR) compounds, and cables.

Innovative Solutions for E-Mobility

The increasing use of electric drives is leading to a higher demand for e.g. connectors, battery systems and charging infrastructures. This presents specific challenges, particularly regarding heat resistance, flame retardancy and electrical properties of the thermoplastics used. Brüggemann's additive portfolio offers tailored solutions.

The latest generation of metal- and halogen-free heat stabilizers, Bruggolen TP-H2217, has been specially developed to meet the needs of the electrical, electronics, and e-mobility industries. It raises the continuous operating temperature of reinforced polyamides to 170 °C for up to 8,000 hours, setting a new industry standard while maintaining comparative tracking index (CTI) and flame retardancy.

In addition to additives for polyamides, the portfolio is being expanded to include stabilizers for cross-linked polyethylene (XLPE) compounds. Bruggolen TP-H2431 is a long-term heat stabilizer specially formulated for cable applications, enabling T3/T4 classification. It is supplied in pellet form and designed for exceptional thermal stability during continuous use and is suitable for applications based on both E-beam and Sioplas technology.

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Kirsten Markgraf, L. Brüggemann

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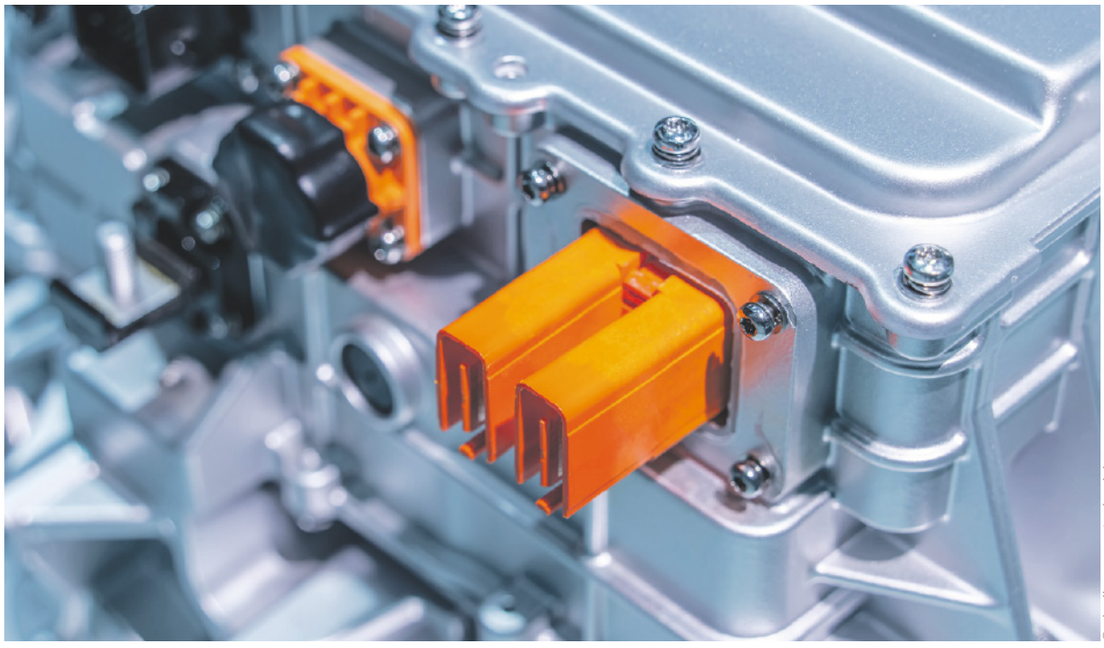
Kristina Frädrich, L. Brüggemann

Additives for the Full Range of Polyamides

In addition to requirements for heat stability and electroneutrality, the use of plastics to create lightweight constructions plays a major role in the transition to electromobility. At the same time, structures are becoming increasingly complex and thinner walls are required without compromising mechanical properties. In order to fulfill these requirements, the use of easy-flowing, reinforced plastics -in particular polyamides is necessary.

Bruggolen P1810 belongs to the group of highly efficient flow improvers and is optimized for the use in semi-aromatic polyamides. While maintaining the mechanical property profile, it enables a significant improvement in the often-critical flow properties of these materials. The excellent flowability that can be achieved with this additive enable high glass fiber contents of up to 60%. Together with Bruggolen P1507 for aliphatic polyamides, the portfolio comprises flow improvers for the entire polyamide spectrum. Manufacturers and converters of corresponding compounds benefit from significantly shorter cycle times and the associated lower energy consumption, amongst other advantages. They can significantly expand the processing window and combine high-cost efficiency with application-specific optimization.

In cases where flame retardancy and high flow are required, Bruggolen P2201 significantly increases flowability without compromising the flame retardancy typically needed for e-mobility applications. This allows glass fiber-reinforced polyamides to be



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Plastic parts used in the electrical and electronics and e-mobility sectors typically feature complex structures, thin walls, and long flow paths, while also having to meet demanding specifications in terms of heat resistance, electrical neutrality, and mechanical properties. Additives from Brüggemann enable these requirements.

© Brüggemann

In 2020, Brüggemann commissioned its state-of-the-art production facility with direct logistics connections, where polymer additives are manufactured in powder and granulate form.

© Brüggemann

This flow spiral demonstrates the excellent suitability of high flow polymer materials for filling mold cavities with long flow paths or small cross-sections. Additives from Brüggemann enable such results even with highly glass fiber-filled polyamides, with increases of up to 60% compared to unmodified reference samples.

processed into thin-walled, complex part designs with long flow paths that exhibit excellent electrical properties, achieving a V0 classification according to UL94.

Recyclates at the Level of Virgin Materials

As an experienced manufacturer of high-performance additives for polyamides, Brüggemann also offers a broad range of additives for the recycling of these engineering plastics. This includes long-term and process stabilizers, flow enhancers, reactive chain modifiers, nucleating agents, and other processing aids. Upcycling for high-quality recyclate applications requires careful selection and combination of these additives. Reactive chain modifiers are particularly important in this context because they enable the precise and robust adjustment of the desired molecular weights and viscosities.

Bruggolen M1251 and M1253, which is easier to dose due to its smaller pellet size, compensate for any molecular weight degradation that may have occurred during previous use through linear chain extension. As a result, this raises the mechanical properties of the recyclate to the level of virgin material. Conversely, Bruggolen M1417 functions to shorten excessively long molecular chains in highly viscous polyamide scrap, for example from profile extrudates, fibers, or cast polyamide.

Low additive dosage and a single extrusion step are sufficient to produce high-quality recycled compounds that are ideal for injection moulding, with performance characteristics that match those of virgin materials. These chain modifiers efficiently prepare PA secondary raw materials for high-end applications, thereby fulfilling an important prerequisite for increasing recycling rates.

Thermostabilizer for PP-based PCR Recyclates

The new Bruggolen R8897 thermo-stabilizer is an innovative solution for optimizing the properties of PP-EPDM recyclates from front-end applications. As a benchmark in its class, it is based on a chemical concept that enables excellent retention of mechanical properties during long-term heat ageing. Laboratory tests have demonstrated significantly improved Charpy impact strength retention after heat ageing.

Thermoreversibly ‘Cross-linked’

Compoback is an innovative additive for use in polyolefin foams, HFFR compounds, cable applications and TPEs. Its addition results in high-temperature environment performance equal to that of cross-linked plastics (thermosets), while maintaining the processability of thermoplastics for reuse and recycling. The additive significantly increases processing efficiency without the need for an additional cross-linking step.

The advantageous properties of the product are particularly evident in extruded, physically foamed polyethylene (PE) profiles with a square cross-section. In laboratory tests, the cross-sectional area of these profiles shrank by around 75% after 24 hours of storage at 100 °C without stabilization. However, when using Compoback and corresponding storage of the profiles, the reduction was negligible — similar to that seen with conventional permanent cross-linking.

Broad Portfolio

In addition to these innovations, Brüggemann will be presenting information about its extensive portfolio of property-enhancing additives for polyamides at K 2025. As a supplement to heat stabilizers, this includes impact modifiers, processing aids, flow improvers, nucleating agents and additives for polymer chain modification, as well as additives that improve the quality and processability of recycled plastics.

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The Value Of Sustainability

Recycled Plastics Are Shaping the Future of Luxury through Enhanced Material Design

There's a paradox at the heart of designing the aesthetics of products with sustainable materials. If you replace a less sustainable material with a more sustainable material but do the job so well that the newer, more responsible version is visually indistinguishable from the original, less responsible version, the question becomes: where does the sustainability story go and how do you communicate your wonderful achievement?

If the biobased, recycled, low-carbon or whatever flavor of environmentally responsible material you've used looks like the original plastic, it's difficult to communicate the sustainability of it, because the end result looks exactly the same. Visually, there's no difference. The paradox at the core of what we as designers do is: in our quest to be sustainable, the sustainability story itself often vanishes. Or does it? It's an important question to ask because so much importance is placed of the environmental angle and making it a feature of the product story—by product I mean anything from car interiors, appliances, sports goods, consumer electronics, etc.

A lot of our work as designers is about replicating our existing knowledge of common plastics and processes but now having to think about it in a responsible, sustainable way. Instead of electroplating plastics to create shiny premium finishes, for example, we might use some sort of recycling-compatible process instead, where the end result is very similar, if not identical, to the original way of doing things. But do we simply want to replicate what we have always done (metallized plastics, shiny surfaces) in a more sustainable way? Or do we actually want to do things differently, capturing the imaginations of consumers and getting them excited about a new way of doing things?

From a strictly environmental point of view, progressive aesthetics are less of a concern so long as everything is achieved in a more responsible way. But are we missing a big opportunity to do something actually very different? Shouldn't we challenge expectations of what is good and desirable CMF (color, materials & finishes)?

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Chris Lefteri Design

Embracing Imperfection

We've long accepted that materials like wood and metal carry their own natural imperfections—knots in timber, patinas on brass or copper—and we even celebrate them as marks of authenticity, age, and beauty. So why don't we do the same with injection-molded plastics?

Some pioneering brands are starting to rewrite the aesthetic of plastic. The Microsoft Xbox Remix Special Edition Controller is a perfect example. Made from post-consumer recycled plastics, its surface shows subtle swirls, flow lines, and color variations—visible traces of the recycled content. Instead of covering these "defects," Microsoft chose to manifest them, making each controller visibly unique.

The Steelcase Perch stool takes this idea further. Produced from hard-to-recycle e-waste plastics, its finish is full of color inconsistencies and ghosting lines caused by the irregular melting behavior of recycled material. Rather than trying to improve the quality of the recycled plastic, Steelcase embraced the imperfect surface—and went even further by donating the most "messy-looking" stools, produced during color transitions, to social innovation partners. They framed these unpredictable aesthetics as a reflection of real-world complexity and change.

> *"It's time to reimagine what beauty and value look like—starting with the materials themselves."*

These examples point to a new opportunity: to shift how we define beauty in plastic and embrace an aesthetic language where the marks of manufacturing processes and raw materials aren't hidden—but become a badge of value and honesty.

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Redefining Luxury

When it comes to more high-end products, where traditional notions of luxury play a crucial role—the challenge is even greater. There's often a strong desire to maintain familiar, high-end aesthetics such as that of metallic surfaces, which can make it harder to introduce new, visibly sustainable materials.

In addition to looking for sustainable solutions to established materials

and finishes like chrome, for example, should we be finding different sustainable processes to denote a new kind of luxury? Should sustainability actually be helping consumers shift their understanding of luxury, rather than just replicate their current one?

Some forward-thinking brands are already showing how this shift can happen. Panasonic, for example, developed Nagori—a plastic material made from minerals leftover from the water purification process. Its layered, precious stone-like aesthetic offers a unique, refined look that can easily compete with the most luxurious conventional materials used for accents and details.

Similarly, unidirectional polypropylene (PP) fibers, commonly used in structural composites, bring a new visual language to nonmaterial plastics. Their linear texture introduces a distinctive, high-end aesthetic that could be embraced as a modern marker of luxury—one rooted in material innovation and 100% recyclability.

The trouble is: mainstream materials such as plastics are still so desirable. They're manufactured to be spotless, pristine and flawless, capturing luxury in an instant. The outcome of 70+ years of designers learning how to use plastics, metals and new finishes. Perfection is still the rule of the day. That's why virgin plastics and others have such a hold on us; it takes a real mind shift to move away from the steady supply of predictable, high-quality and optimized virgin materials that we have become so used to.

Sustainable Aesthetics in Plastic Design

One of the big trends in sustainable materials over the last few years has been speckled aesthetic. Whether from natural fibers or inorganic filler waste, these effects push material storytelling in a better direction. Not only do they celebrate the recycled or biobased origin of the material, but they also create one-off, unrepeatable aesthetics, giving each product a unique fingerprint tied to its sustainability story.

Several brands, including key players in the automotive industry, have started to embrace this new aesthetic at scale, working closely with material suppliers to develop innovative recycled grades that make sustainability visible. A notable example is the Volvo EX30, which features speckled door panels and upholstery from recycled materials. These distinctive textures have become a defining element of the car's interior design.

Similarly, Dacia, in partnership with LyondellBasell, has introduced speckled plastic components across its vehicle interiors, using post-consumer recycled content. These finishes bring a sustainability-driven aesthetic to cars, making the material's recycled origin visibly clear—a deliberate shift away from the industry's long-standing pursuit of flawless, uniform surfaces.

The Future of Sustainable Design

What else is there beyond speckling, marbling and degraded surfaces? One way forward is to bring mainstream and sustainability together in a better way. For example, what if we went the opposite direction from random speckle patterning and made something really consistent, taking into account the parameters of plastic manufacturing, to potentially reach a broader appeal than the current speckles approach, while still using recycled materials? Just as an example, you might have fine evenly distributed waste particles rather than randomly positioned speckles. This would be an evolutionary adjustment where the end result almost looks the same, but the consumer understands the slight difference.

People want to buy products that have a gentler effect on the planet—but they also care how their products look and feel. There is certainly a novelty factor in much of this—sustainability has got some great stories about novelty and innovation to tell. Many consumers are compelled to buy because of the sheer novelty of the item. That's where we, as CMF designers, come in. In a context of sustainability, our role as designer is not just to make things look good, but to make the sustainability story a joyful, desirable one. It's about shifting the narrative so that responsible materials aren't seen as a compromise, but as something aspirational and beautiful.

Of course, this will require a collaborative learning curve, where industrial designers, CMF specialists, material scientists, and plastic and finish manufacturers work together more closely than ever before. Together, we need to forge a new aesthetic language—one that makes sustainability visible, honest, and desirable.

That's exactly the spirit behind the tour I will be leading at the K Show. I've curated a selection of the most innovative and forward-thinking solutions in sustainable plastics, materials, and finishes—solutions that are available to all of us, right now, as a starting point in this exciting new journey. My goal is to give designers fresh inspiration, real examples, and the tools to start shaping a future where design excellence and sustainability go hand in hand. It's time to reimagine what beauty and value look like—starting with the materials themselves.

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Material libraries bring tangible inspiration and multi-disciplinary material exploration to product designers in various industries. Such samples, for instance, support them in understanding that sustainability and luxury do not have to be mutually exclusive.

"We need to forge a new aesthetic language—one that makes sustainability visible, honest, and desirable."

Interestingly, many consumers appear open to this shift. There's growing enthusiasm for products that visibly signal a move away from polluting, resource-intensive production. But the real resistance often comes from within—from decision makers concerned about non having enough appeal to mass market or from quality control teams who struggle with the lack of clear, measurable standards against which to assess these new, inherently variable materials.

Chris Lefteri, Material Design Expert, Founder and Director, Chris Lefteri Design, London, UK

■ www.chrislefteri.com/about

K 2025: Explore the Future of Plastics

The final countdown to K 2025 began on June 30. Exactly 100 days later, the world's most important plastics trade fair will open its doors. Over 200,000 visitors from around 160 countries are expected to attend.

A highlight of the trade fair: the special show "Plastics Shape the Future", which Plastics Europe Deutschland is curating for Messe Düsseldorf for the sixth time. The last K years have shown that the special show is like a seismograph for the direction of the industry. Where does it stand and where does it want to go?

Seven Days of Concentrated Innovation, Discussion and Encounters

On seven themed days, the special show will focus on innovations, transformation, technologies and trends. Science slams, start-up pitches, expert talks and guided trade fair tours will make it possible to see how the circular economy and competitiveness can be put into practice. In addition, formats such as "Women in Plastics" and "Career Sunday" provide new impetus where change goes beyond technology.

Insider Tip: "Circular Thursday"

If you want to know how the circular economy works in practice, you should mark "Circular Thursday" in your diary. On Thursday, October 9, research and industry will come together to discuss the circular management of packaging, textiles, electrics and electronics and the construction sector, recyclate usage rates and how mechanical and chemical recycling can be optimally combined. We will look at different perspectives on and experiences with current regulatory projects such as the Packaging and Packaging Waste Regulation (PPWR), the End of Life Vehicle Regulation (ELV) and the Waste Electrical and Electronic Equipment Regulation (WEEE). The experts from the various application industries will discuss current challenges and provide an insight into their experiences as well as an outlook for the future: What can industry, politics and authorities learn from these experiences? What are the advantages and disadvantages of Closed Loop? How high should recyclate use rates be? Do we have enough waste to meet the specified use quotas?

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Bettina Dempewolf, Head of Communications Division, Plastics Europe Deutschland

Program of the Theme Days at the Special Showcase "Plastics Shape the Future" by Plastics Europe Deutschland

Date	Theme Day	Highlights
Oct. 8	Kick-Off Wednesday	Opening, Industry Outlook, Competitiveness, Facts and Figures
Oct. 9	Circular Thursday	Packaging, Textiles, Electronics, Construction – Mechanical & Chemical Recycling
Oct. 10	Climate Friday	CO_2 Balances, LCA, Additives, Monetization Of Sustainable Products, Circular Business Models, Competitiveness
Oct. 11	Smart Saturday	AI in use along the value chain: Material Development, Process Optimization, Recycling, Sensor Technology, Digital Product Passport, EU Data Act
Oct. 12	Career Sunday	Recruiting, Diversity, Science & Poetry Slam, Women in Plastics
Oct. 13	Innovation Monday	Start-up Pitches (Newcomer & Big Fish), Networking, Innovation Panel
Oct. 14	Visionary Tuesday	Circular Tech (Bioplastics, CCU, Recycling), Future Outlook 2050, Micro Plastics

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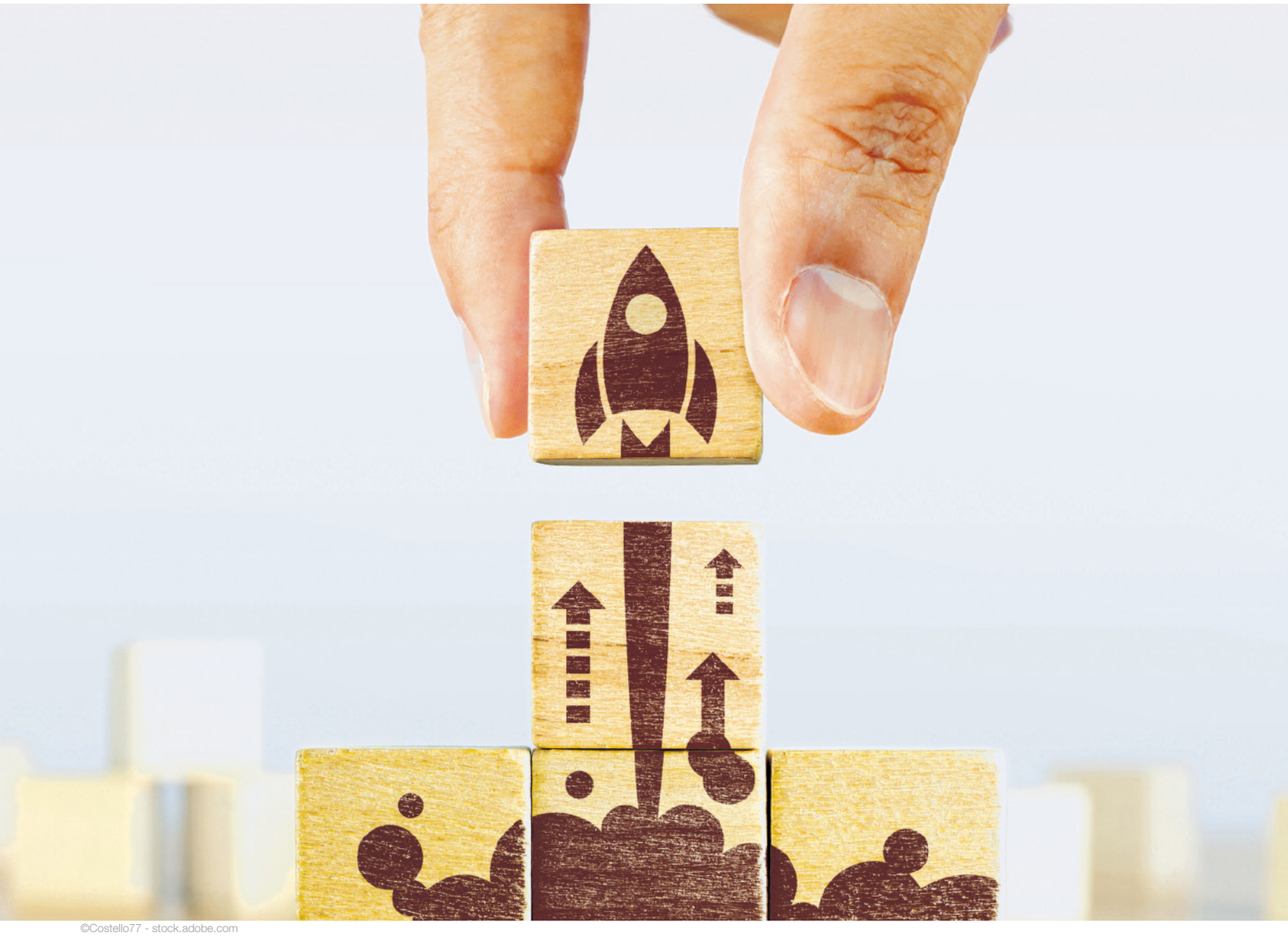
INNOVATION PITCH



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Scaling Enzyme Innovation from Concept to Industry

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Turning Water into Fuel

Revolution in Electrolyzer Efficiency and Sustainability

Elementarhy uses a revolutionary plasma technology, positioning it as a leader in supplying cost-efficient and scalable Membrane Electrode Assemblies (MEAs) to electrolyzer manufacturers. We develop, produce, and recycle customer-centric MEAs, while minimizing the use of critical raw materials (-95%), delivering outstanding performance and best-in-class quality.

CHEManager: Can you briefly tell us about your start-up and what inspired you to launch it?

Gustav Sievers: Elementarhy is an innovative green technology startup dedicated to transforming the energy economy. We urgently need the link between renewable energy and molecules. Splitting water is the first step. We aim to provide solutions for the electrochemical energy transformation through the development of Membrane Electrode Assemblies—MEAs—for electrolyzers. We understood the need for energy security and cost efficiency during the 2022 European energy crisis and started positioning Elementarhy as a leader in the green hydrogen supply chain. We have developed the missing part to make the hydrogen economy possible. With our MEA, we make green hydrogen production cost-efficient and scalable. This can be translated into fertilizer, methanol, eFuels or other chemicals. Our technology enables manufacturers to produce 20x more electrolyzer, reduces the cost up to 50% and increases supply security.

What does the name Elementarhy mean?

G. Sievers: In our energy society we have a big technological change upcoming. We need to electrify all fossil molecules like fertilizer, methanol, fuels and much more. For this hydrogen is elementary.

To build a hydrogen production system, you'd typically start with the electrochemical "chip". The MEA where the water splitting is done. This defines the performance and the durability of the whole hydrogen production system.

What is your core innovation?Tell us about your membrane electrode assembly technology—what makes it unique?

Zahra Nasri: Elementarhy's key innovation is a patented, plasma-based technology that dramatically reduces the reliance on critical raw materials like iridium, using up to 20x less iridium than traditional solutions. This reduction in catalyst consumption directly translates into lower production costs and alleviates the bottleneck for iridium, a key concern for manufacturers. By utilizing plasma-based processes to built MEA, Elementarhy offers a more scalable, cost-efficient, and environmentally friendly solution compared to conventional methods.

Why does this matter now? How does your solution contribute to a zero emission society, and what advantages does it offer over existing approaches?

Z. Nasri: The green hydrogen market today faces significant cost challenges, including the reliance on fossil fuels and the need to meet ambitious decarbonization goals set by governments worldwide. Hydrogen production must be scaled up by 200× to achieve net-zero targets, which is currently impossible. Existing green hydrogen production methods involve high costs, critical raw materials, and limited scalability, showing the need for better solutions.

In simple terms, Elementarhy provides the missing piece to enable the scaling of green hydrogen production. By lowering the consumption of critical raw materials (-95%), ensuring performance, and offering scalable, cost-efficient solutions, Elementarhy is poised to lead the green tech revolution in the hydrogen economy. Elementarhy's MEAs are also recyclable, offering long-term sustainability for manufacturers and end-users.

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Gustav Sievers, CEO/CTO, Elementarhy

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Zahra Nasri, CSO/ Quality Management, Elementarhy

Can you highlight key milestones—such as funding rounds, pilot projects, or industry recognition?

G. Sievers: We began our journey in 2013 with a groundbreaking discovery, achieving record-breaking activity published in Nature Materials, and validated through collaborations with research institutions such as the German Aerospace Center. We raised €3.6 million non-dilutive grants through funding, won the Leibniz Price, and were-named the best European hydrogen startup 2025. We've secured customer orders and established high testing capabilities with global product library across Asia, Europe and America for customer-centric solutions. So far we have achieved >10.000 hours runtime with a single MEA. We aim for our first pilot project to start this year.

What are your goals for the next year or two?

G. Sievers: We have a small-scale production line in operation—TRL 6+. We are raising funding aiming for scaled mass production, with steps at 100 kW at TRL 7 and >400 kW at TRL 8 with a first MW innovation line PEM electrolyzer stack of a customer at late stage TRL 8.

We want to transform current validation projects into binding contracts for joined MW projects, improve the production process from the current TRL 6 to TRL 8 and minimize costs in industrial scaling.

Personal Profiles

Gustav Sievers, a trained environmental scientist and an expert in electrochemistry, is at the forefront of Elementarhy's technological innovations with a strong focus on customer coordination, innovation, and patent development. As a serial enterpreneur he brings extensive expertise in building hardware-focused companies and leading electrochemical research projects. His leadership has resulted in successful collaborations with the University of Copenhagen and the German Aerospace Center (DLR), where his innovative methods for PEM electrolysis were successfully validated. He is committed to driving the Exist research transfer initiative, translating scientific innovations into market-ready products.

Zahra Nasri holds a Ph.D. in analytical chemistry and is an expert in catalysis and electrochemical applications. At Elementarhy, Zahra Nasri oversees quality management, ensuring that each membrane electrode assembly meets the company's rigorous standards. Her in-depth knowledge of electrochemical processes and catalysts drives continuous improvements in product performance and supports the long-term durability of Elementarhy's solutions.

Business Idea

Scaling Hydrogen to live in a Zero-Emission Society

Elementarhy, drawing on over 60 years of electrochemical and energy business expertise, provides the key component for electrolyzers: the high-margin Membrane Electrode Assembly (MEA). Through a unique approach that combines the innovative solution with a flexible production strategy, advanced testing, and a global reach, Elementarhy solves the Gordian knot of balancing cost, quality, and scalability. The company's tailored solutions and strategic partnerships empower electrolyzer manufacturers to reduce their supply costs and increase security of supply.

Elementarhy's business model ensures high flexibility and low prices through small-scale customization during the product validation phase. Once the optimal product fit is established, the company leverages scalable options. The sales cycle for Elementarhy is a long-term, consultative process designed to build strong, trust-based relationships with electrolyzer manufacturers. Spanning 10 – 16 months, this cycle focuses on understanding customer needs, offering tailored solutions, and establishing a deep level of mutual trust. The process involves frequent, iterative testing and refinement based on customer feedback, ensuring that the product is perfectly aligned with the customer's needs.

Elementarhy thrives on partnerships with industry leaders across the value chain to ensure innovation, scalability, and quality. Elementarhy operates a global supply chain, ensuring flexibility, resilience, and cost optimization offers customers access to best-in-class MEA designs tailored to their specific stack requirements.

State-of-the-art testing capabilities allow Elementarhy to optimize the fit and performance of MEAs for individual customers. This includes rapid on-site customization at the current production line to match specific customer needs while keeping costs low. These capabilities reduce the need for customer-side testing and CAPEX investment, accelerating time-to-market for new electrolyzer stacks.

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e|Hy elementarhy

Elevator Pitch

Next-Level Membrane Electrode Assembly

We have developed the Membrane Electrode Assembly (MEA) for PEM electrolyzer that only needs 25 g/MW Iridium compared to 500 g/MW of competitors at the same performance. We reduce the costs of the MEA of up to 50% and increase the security of supply. This significant reduction lowers the dependence on imports and cuts costs. In addition, we provide a plug and play performance guarantee, which reduces assembly times for our customers. Finally, our e|MEA is already PFAS-free in the catalyst layer, ensuring that our customers are not affected by the targeted PFAS ban in 2026, in contrast to competitor products.

Milestones

2013
- Invention of technology
- Securing several public funding grants

2014
- First Patent

2019-2022
- Validation project funded by BMBF to validate the technology in application

2020
- Nature Materials Paper accepted

2023
- EXIST Forschungstransfer BMWK funding 1.8 m€

2024
- Full production line running and already >20 kW produced Foundation of Elementarhy

2025
- US Patent accepted

Roadmap

Elementarhy aims to become a leading supplier in the hydrogen industry by building on its core innovation: a scalable, efficient hydrogen production system.

The roadmap focuses on three key phases—expanding intellectual property through strategic patents, scaling production capabilities together with partners to meet growing demand, and establishing a strong market presence through partnerships and global reach.

By combining technical innovation with sustainable manufacturing, Elementarhy is positioned to drive the next generation of clean energy solutions.

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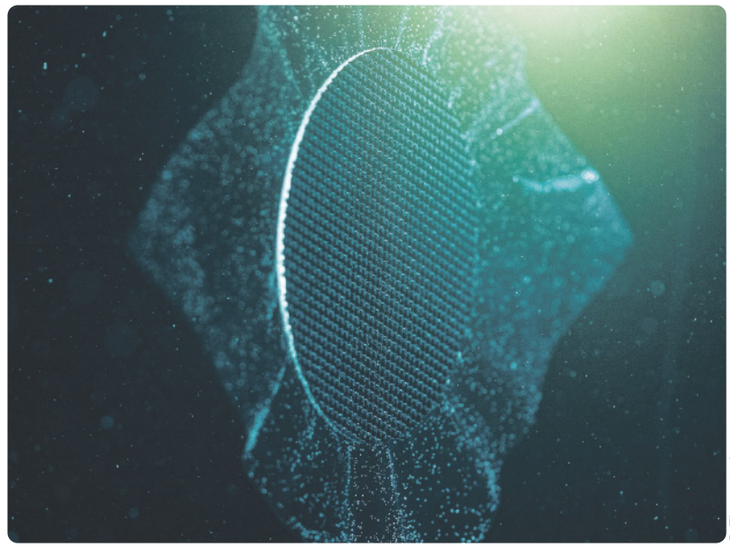
The Elementarhy part for hydrogen production to live in a zero emission society



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Elementarhy uses plasma technology to make green hydrogen production cost-efficient and scalable to live in a zero-emission and space-exploring society.

Enzyme Guide for Biocatalysis

Bringing Biocatalytic Processes from Early Idea to Industrial Scale

Aminoverse enables players in the chemical industry to onboard more cost-efficient and sustainable manufacturing by delivering the right enzyme and process. With its proprietary symbiosis of wet lab work, state-of-the-art in-silico modelling, and data-driven AI, the Dutch start-up company founded in 2020 removes bottlenecks in enzyme science like long lead times or uncertain research outcomes. David Schönauer, founder and CEO of Aminoverse, shares insights into the motivation behind the company, the unique value that its enzyme services and products bring to the industry, and provides an outlook into the company's future.

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David Schönauer, Founder and CEO, Aminoverse

Personal Profile

David Schönauer, with over 15 years of entrepreneurial experience in biotechnology, founded Aminoverse in 2020. Driven by a passion for translating cutting-edge science into global benefit, he leverages enzymes, aka 'nature's tiny but effective workers'. His career highlights collaborations with various industry partners, guiding them in patenting and commercializing enzyme-based innovations. He holds an M.Sc. degree in Molecular and Applied Biotechnology from RWTH Aachen University, Germany, and fosters a 'builder mentality', turning scientific ideas into hands-on industrial-scale solutions.

CHEManager: Why are enzymes valuable tools for solving industrial challenges?

David Schönauer: Enzymes are steadily revolutionizing industry by delivering economic and environmental benefits at metric ton scale. Economically, enzymes make processes more efficient, cut energy use, raw material costs, and waste, which directly boosts profitability or enables new products. Their innately high regio- and stereoselectivity ensures precise reactions and purer molecules.

> *"Enzymes are steadily revolutionizing industry by delivering economic and environmental benefits at metric ton scale."*

With broad substrate and reaction spectra, enzymes adapt to virtually all chemical targets. Unlike metal catalysts, enzyme catalysts can be tuned to the reaction of interest to obtain >99% yields and ee values, or enhance operational stability under harsh conditions. Finally, enzyme immobilization allows the recycling of the biocatalyst and thus reduction of cost of goods; crucial for the production of compounds with a value below 100 $/kg.

Ecologically, enzymes foster greener chemistry under mild conditions, reduce hazardous chemicals and energy consumption, and align perfectly with evolving regulations.

Which kind of services does Aminoverse provide?

D. Schönauer: We aim to be a turn-key solution provider, supporting customers from initial idea to industrial application. We only need information about the intended application/production process and the chemical reaction. The final result is a working enzymatic process and enzyme supply up to high kg scale. All steps in between are also available as a standalone service, like identifying the right enzyme, defining suitable production conditions, or optimizing the biocatalyst by enzyme engineering. Some customers also rely on us only for the development of robust assays, or the supply of off-the-shelf enzyme kits for immediate hit screening.

How does your technology impact R&D projects?

D. Schönauer: Our service offering is centered around three AI-augmented workflows: EnzyNAV AI, EnzyMAP AI, and EnzyREC AI. EnzyNAV AI is our intelligent guide for enzyme discovery. It leverages bioinformatics, metagenomics, and computational chemistry to navigate through more than 4 billion enzyme sequences and structures to find promising candidates for the reaction of interest.

Additionally, we also make sure that the selected enzymes are free of 3rd-party IP.

Once a suitable enzyme is identified yet displays unsatisfactory performance, we employ EnzyMAP AI and EnzyREC AI to optimize it further. EnzyMAP AI highlights the enzyme regions with the highest improvement chances by predicting the functional effects of every possible point mutation across the enzyme. This allows us to effectively map the enzyme's entire fitness landscape, reducing the need for wet lab screening by up to 80%, cutting project costs. Global enzyme leaders like BASF, Novonesis, and IFF optimize enzymes via this holistic approach.

> *"Our off-the-shelf enzyme kits allow our customers to test enzymes within days and thus make time-sensitive decisions during route scouting as fast as possible."*

Eventually, EnzyREC AI recombines beneficial mutations to design stable, highly functional enzymes, avoiding unstable or unproducible novel enzymes.

Together, these three platforms bring precision, speed, and significantly reduce risk and cost in enzyme application while reducing time-to-market of the biocatalytic process altogether.

Why does Aminoverse offer products in addition to its R&D services?

D. Schönauer: Our off-the-shelf enzyme kits allow our customers to test enzymes within days and thus make time-sensitive decisions during route scouting as fast as possible. This facilitates internal budgeting, since early "successes" advance the project to the next stage and unlock more budget for further development—especially in organizations in which biocatalysis still plays a minor role and managers fight an uphill battle.

What will be the next steps to develop the company?

D. Schönauer: We aim to become the go-to partner for everything about enzymes. We're continuously refining our AI algorithms, streamlining our wet lab workflows, and expanding our enzyme kits, to serve more industries, faster. A major milestone on the horizon will be the shift from optimizing existing enzymes to designing them entirely from scratch, called de novo design. Once we deem it robust and suitable enough, our customers will be able to directly benefit from the increased development speed that will unlock more business cases which previously could not be pursued.

Business Idea

All About Enzymes

Aminoverse is committed to transforming enzyme science from the lab bench into practical, industrial solutions. Starting with the end in mind, Aminoverse consults on the feasibility of enzymatic solutions, offers cutting-edge research services and sees itself as a temporary extension of the customer's R&D team.

As a contract research organization (CRO), Aminoverse strives to minimize the risk in research and make sure innovation is not held back by the enzyme or its application. Starting with the exact reaction or process goals, the multidisciplinary team finds enzyme candidates with the desired functionalities and optimizes their performance and stability through advanced enzyme engineering.

The start-up also builds and manages enzyme libraries, providing access to a wide range of tailored biocatalysts. Equally important, the team develops robust assays for precise characterization and validation. And finally, Aminoverse scales up enzyme production to deliver reliable, high-quality solutions ready for industry.

What truly sets Aminoverse apart is its integrated approach. The enzyme experts bring together wet lab experiments and practical testing with state-of-the-art in silico tools and their own machine learning platforms. This synergy moves them beyond slow, trial-and-error steps. Instead, the team designs enzymes that are more effective, faster to develop, and environmentally sustainable. The biotech CRO merges data, science, and technology to unlock enzyme potential in a smarter way.

The client-centric business model is straightforward and transparent: fee-for-service, with clients keeping full IP rights and no royalties. Aminoverse fosters close collaboration through weekly updates and open communication. This close partnership ensures every project stays on track, adapts quickly when needed, and reaches the common goal: developing enzymatic processes that truly make a difference.

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AMINOVERSE
EXPLORING ENZYME INNOVATION

Elevator Pitch

Milestones & Roadmap

As an enzyme-dedicated CRO, Aminoverse enables customers to maximize profitability, minimize cost, and enable greener manufacturing by establishing and enhancing enzyme-based production processes and products. The team excels in two areas: discovering the right enzyme and designing the optimal enzyme by integrating wet lab, biophysics, and cutting-edge AI. The unique approach leverages three AI-augmented platforms: EnzyNAV AI to find the best enzyme candidate, EnzyMAP AI to pinpoint the best mutations, and EnzyREC AI to design superior enzymes. This strategy increases success chances by 10-fold and reduces R&D spend by up to 75%.

Aminoverse tunes the enzyme's substrate preference, regio- and stereoselectivity and operational stability under various pH, temperatures, and solvent conditions. Customers benefit from full IP ownership. With experience across more than 30 enzyme classes, the Dutch start-up company served over 50 global companies across pharma, flavors & fragrances, and agrochemicals, as highlighted on the website and in testimonials.

With a team of 20 interdisciplinary professionals the start-up company reached profitability 3.5 years after its inception, without VC funding. This reflects the team's commitment to relentlessly pushing the boundaries of enzyme innovation in a sustainable, long-term-oriented way, placing customer-benefit over pure-growth mindset.

Milestones

2020
- Aminoverse established in Nuth, The Netherlands, with 200 m² wet lab

2021
- Product-based business: Launch of Aminoverse's hydroxylation enzyme kits

2022
- ML-guided services: Successful application of EnzyMAP AI in client project

2023
- Break-even

2025
- Additional enzyme panels, advanced AI platforms, and over 50 different clients

Roadmap

2025
- Diversification of ready-to-use enzyme panels
- Set-up of a platform for de novo enzyme design

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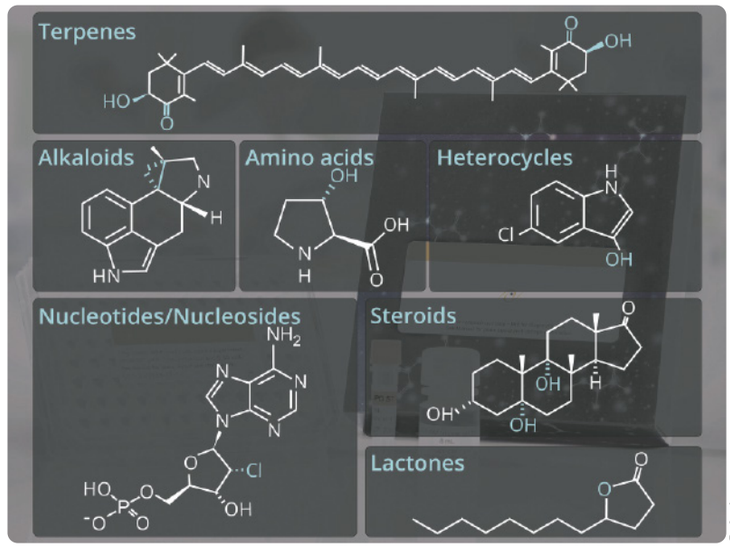
Aminoverse supports customers from enzyme ideas to industrial biocatalytic scale by combining wet lab, in silico design, and proprietary machine learning.



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Potential products from the Aminoverse off-the-shelf enzyme kits to facilitate time-sensitive decisions during route scouting.

K 2025

Since the first exhibition in Düsseldorf in 1952, the letter "K" has embodied the fascination for the world of plastics and rubber. K is considered the leading plastics trade fair attracting a large number of professionals from production, processing and related sectors such as mechanical engineering, the automotive, construction, packaging, electronics, and medical technology industry from all over the world. K 2025 will take place October 8 – 15, 2025 in Düsseldorf, Germany.

■ www.k-online.com

Sepawa Congress 2025

Sepawa Congress 2025 will transform Berlin's ECC Estrel Congress Center into the European hotspot for professionals in the detergents, cleaning agents, cosmetics, and fragrance industries from October 15 – 17, 2025. Every year, more than 3,500 attendees and 300+ exhibitors gather to discover emerging trends, source new ingredients, and share scientific insights across personal care and household product sectors.

■ www.sepawa.com/congress

CPhI Frankfurt 2025

More than 60,000 visitors are expected to attend CPhI Frankfurt in Frankfurt, Germany, October 28 – 30, 2025. As the world's largest event dedicated to pharmaceutical developments, trends, products, and services CPhI Frankfurt provides an industry-leading setting to network with experts from suppliers and service providers to the pharmaceutical industry and source chemical ingredients as well as pharma manufacturing and packaging equipment.

■ www.cphi.com/europe

GPCA Forum 2025

The Annual GPCA Forum, the flagship event of the Gulf Petrochemicals and Chemicals Association (GPCA), has earned its reputation as the premier gathering of the chemical and petrochemical industry in the Arabian Gulf region. The 19th edition of the forum, which will take place under the motto "Catalyzing Competitiveness through Strategic Partnerships" in Bahrain, December 8 – 11, 2025, will once again include the GPCA StartUp Nexus.

■ www.gpcaforum.com

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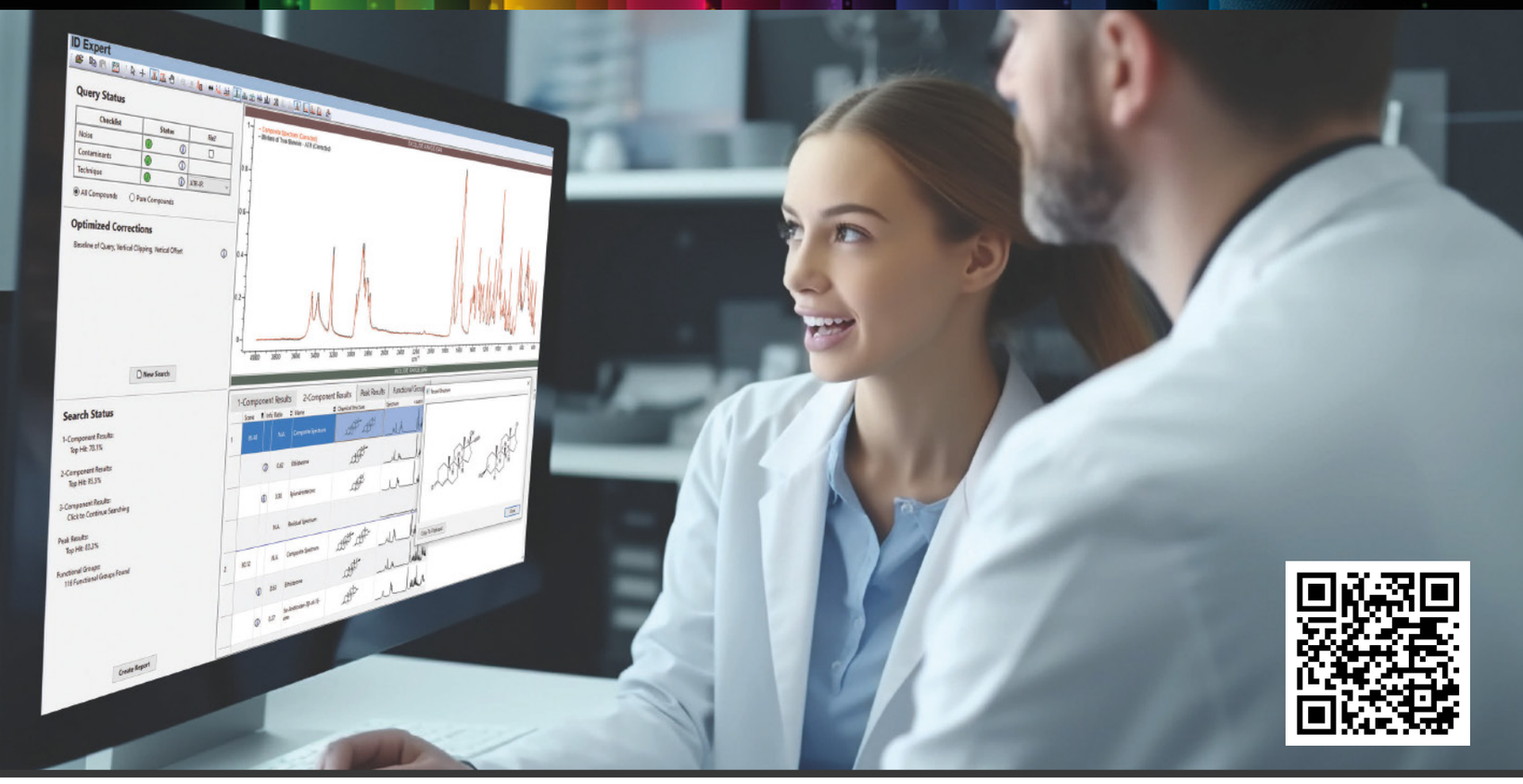

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