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ecp-journal

EUROPEAN CHEMISTRY PARTNERING

MAGICAL MOMENTS

3RD ECP & 1ST ECP SUMMER SUMMIT

CHEMISTRY MAKES THE WORLD GO AROUND

INTERVIEWS, STATISTICS, IMPRESSIONS

NEW PLASTICS ECONOMY

LINK TO FULL LENGTH PODCAST ON PAGE 44

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modular construction

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A GROWING COMMUNITY!

Dr. Holger Bengs
Initiator and Organizer of the European Chemistry Partnering and CEO and Managing Partner of BCNP Consultants GmbH, Frankfurt am Main and Cologne, Germany

More than 800 participants from 40 nations, over 2,000 partnering meetings, 53 exhibitors, 5 workshops, 110 pitches, including 9 from global giants, a stirring keynote, an inspiring panel and many, many networking opportunities in a friendly atmosphere ... that's the balance of 3rd European Chemistry Partnering.

My passion, to bring people together across borders and disciplines all along the chemical value chain – to talk about innovations, would not have been so successful, if all of you, dear ECP participants, had not also passionately helped bring the ECP and the chemical community to life and growth. My sincere thanks go to the start-ups, to the small and large industrial companies, the investors and the many experts from research institutions, clusters, organizations and consulting firms. All of you together reflect the diversity that is essential to manage our planet more sustainably, to solve the big questions of the day and at the same time to increase prosperity for all.

Allow yourself to be further inspired by this issue of the ECP Journal which reviews the 3rd ECP and the first ECP Summer Summit last September. New food for thought is also provided by the figures, data and facts about the ECP and the specialist information from our main sponsors; the International Sustainable Chemistry Collaborative Center, ISC_3 (p. 16-17), HessenTrade and Invest, HTAI (p. 20-21), Fox Corporate Finance, FCF (p. 26-27) and the law firm Dentons (p. 31).

We pay tribute to our sponsors, supporters and media partners on pages 5, 15 and 25. Without all of you, the ECP would not have become the great success it has within just two and a half years with four events already. I shout very loudly: DANKESCHÖN! THANK YOU!

We will meet again at the 2nd ECP Summer Summit on 26 September 2019 in Düsseldorf at Henkel.

Chemistry makes the World go around.

Dr. Holger Bengs

P.S.
We would welcome your feedback, your critique and your suggestions: Our aim is to constantly improve our performance so that you can enjoy even more success at the ECP:
partnering@european-chemistry-partnering.com

Content

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Voices of 3rd ECP

"As always, Holger and his team created an extraordinary opportunity to meet top people in a fast-paced environment and leverage everyone's presence to the maximum."
Josko Bobanovic, Partner, Sofinnova Partners

"It was great to attend the ECP 2019 in Frankfurt. It allowed me to broaden my chemicals network and make very relevant business connections in the world of chemistry."
Pranshu Rohatgi, Manager - Chemicals M&A, PwC-Germany

"ECP created an excellent atmosphere of partnering – especially with the key note and the balance between offering and interest."
Ruediger Wissemborski, Budenheim, Senior Innovation and Application Development Manager

"The established meeting point for chemical innovators."
Dr. Juergen Stebani, CEO, Polymaterials AG

"Most efficient event to access potential partners of the European chemistry community."
Konstantinos Antonopoulos, Co-Founder and CEO, mk2 Biotechnologies

"Again, a great event – more people, more contacts – the whole chemical industry (including coatings, plastics, processing aids (cooling lubricants etc.) looking for new things should participate."
Bernhard Münzing, Sales Director, The Sixth Element

"This is my 3rd ECP and for sure I will be there for the next editions. This is a unique opportunity to have new partnering opportunities in a one-day event."
Guy Helin, Co-founder & CEO, Syngulon

"For a small tech company, this is a very interesting and unique opportunity to get in direct contact with some of the largest players in the world and communicate our technologies, our ideas, our products, our concepts, in an environment in which these players are ready to listen to us and share their needs and requirements. Unique opportunity!"
Carlos Oliveira, CEO of VentilAQUA

"The ONE really focused meeting on chemistry innovation in central Europe."
Klaus-Peter Stengele, Roche Diagnostics, Technology Innovation

"It was an intense day, but worth every minute of it. During the ECP I had the chance to meet industry leaders, visionary entrepreneurs and good old friends. I gained a lot of business ideas and new leads. Not bad for my first time, and it certainly will not be the last time."
Hector Ruiz, Division Manager Chemicals, Unimatec Chemicals Europe GmbH

"I believe that 3rd European Chemistry Partnering is on the way to become one of the most relevant events in Europe and seems to be already well accepted by relevant experts in chemical and related biotechnology topics. I also appreciated that despite many hundreds of participants, Mr. Bengs managed to establish a friendly and trustful atmosphere by saying 'Welcome class-mates' in his opening speech. Thanks for an exciting networking day in Frankfurt!"
Julia Dohnt-Buchheit, Enterprise Europe Network, IMG Innovations-Management GmbH

"Thanks to the great event, we increased visibility and awareness for Corden BioChem. Choosing a booth this year attracted potential customers and lead to very interesting discussions. Definitely a place to be for the following years!"
Dr. Jörg Ohl, Senior Business Development Manager, Corden BioChem GmbH

"Great mix of formats allowing to finetune my program for maximum interaction and value. Participated first time, will be back for ECP#4!"
Joachim Dohm, SVP Corporate Development, CABB Group

"ECP is the initiator of a path of no return for the creation and growth of a European network focused on research development, innovation and entrepreneurship in chemistry and materials. Large, medium, small and start-up chemical companies together with incubators, accelerators and venture capitalists – all breathing the same spirit of collab-oration and cooperation towards a unique interconnected European ecosystem. It's time for the chemistry Revolution, no doubt."
Pablo R. Outón - Founder and CEO at INDRESMAT

"Well organized, nice people from many countries and the 'speed-dating' was excellent. I am looking forward to the 4th ECP."
Wolfgang R.Schmidt, Managing Director, axxana GmbH

"MAGICAL MOMENTS CAN BE ORGANIZED"

ECP experiences exponential growth as an exceptional opportunity for boosting innovation

By Joachim Pietzsch

A very emotional Key Note:
Dr. Gerhard Dust (PolyCare Research Technology GmbH & Co. KG)

It's been an exponential growth, resembling an avalanche of connectivity: While the 1st European Chemistry Partnering Meeting in 2017 was attended by 135 delegates from 15 countries, its third edition on 26 February 2019 saw more than 800 participants from 40 countries. Last year's move of the meeting from the time-honored premises of Frankfurt's chamber of commerce, where it all started, to the spacious Kap Europa Congress Centre with its four floors and its high floor-to-ceiling window fronts mirrors its growing success. "Here I find an inspiring mix of people, cultures, companies and competences, and also a fair balance between male and female experts and executives", commented third-time participant Iwona Kaluzna, Marketing & Sales Director of the Dutch R&D service provider InnoSyn. "It is a perfect place for networking, learning, and doing business." An event whose importance and impact are also recognized by more and more regional partners such as the renowned Airport Club Frankfurt that was present for the first time with a booth showcasing the opportunities it offers.

A role model for social entrepreneurship

"Almost everything in life depends on when we meet whom and what we talk about", Gerhard Dust said in his key note lecture. "There are magical moments that lead our life into a different direction. They happen coincidentally and sometimes are pure luck – but they can be organized. Today, many of you will meet new people and thereby take their company

Opening Words: Dr. Holger Bengs
(BCNP Consultants GmbH)

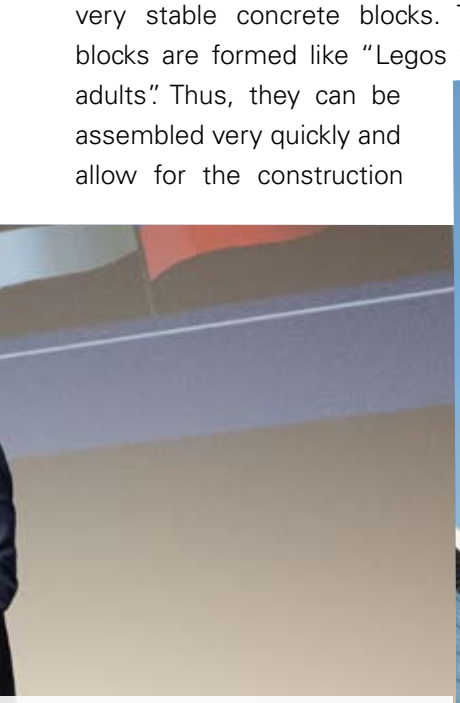
or their ideas one step further. Let us thank Holger Bengs and his team for organizing such magical moments." In his impressive talk, Dust shared three coincidental moments that had shaped his career during the last decade and made him become Managing Director of PolyCare Research Technology.

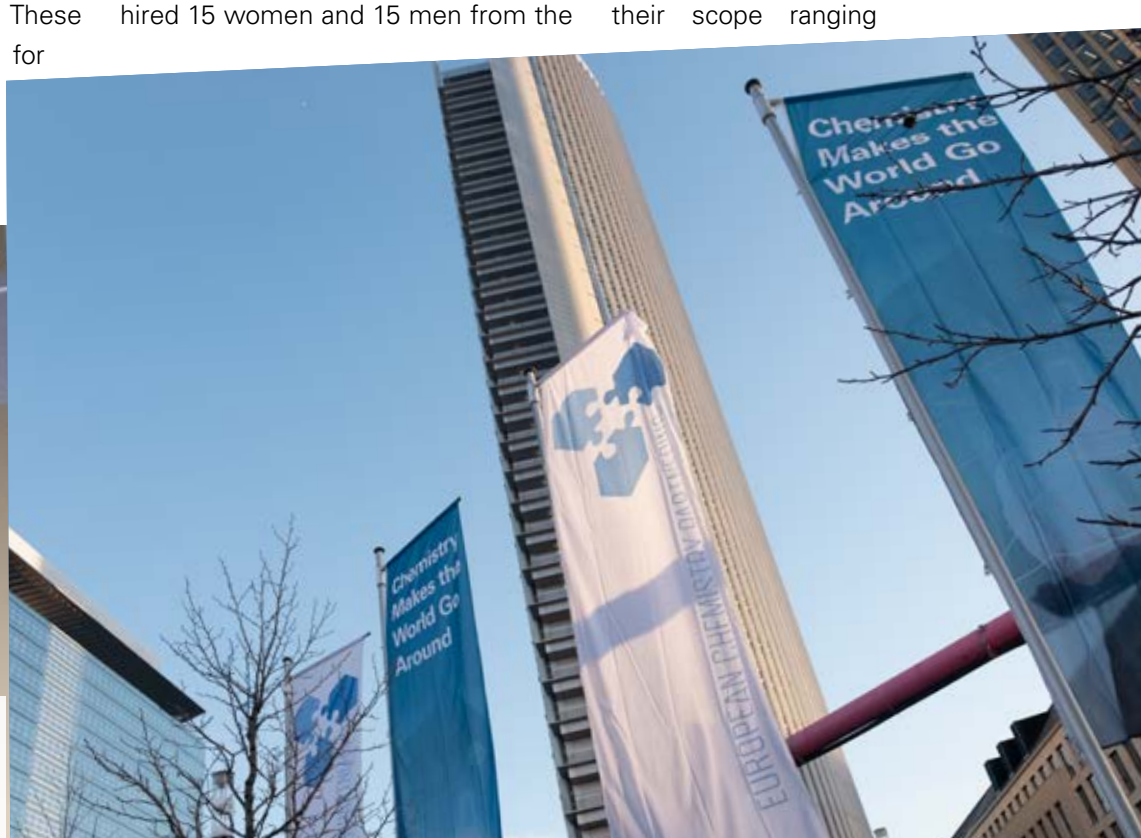
Having spent a successful life in the construction and book industry, Dust had just retired at the age of 58 and settled with this family in Florida, when the neighboring island of Haiti was hit by a horrible earthquake in 2010. "I immediately felt committed to help people affected by such disasters to rebuild their houses." In this situation, he remembered the call of an East German engineer, Gunther Plötner, who had asked him in 2008 to invest in his invention, namely to produce very strong polymer concrete with abundant and affordable desert sand, which until then had been regarded as totally unsuitable for this purpose. "I initially had declined his request, but now I bought in and we founded PolyCare". Soon, they were able to produce very stable concrete blocks. These blocks are formed like "Legos for adults". Thus, they can be assembled very quickly and allow for the construction of a house within two days. Despite of some recognition that PolyCare received for this invention, its full advantage would have gone merely unnoticed, however, had Gerhard Dust not accidentally met the ambassador of Namibia in 2014. In his country, the ambassador said, one quarter of the population lived in shacks. "Why wouldn't you build a model house in Namibia and show it to the people and test the social acceptance of it?"

Dust and his team followed the ambassador's invitation. They produced the blocks in Germany, shipped them to Windhoek and built their model house with the help of four native workers within two days. This all happened on occasion of a conference "Invest in Namibia", and so the country's president and all his ministers and more than 2000 people were able to admire the amazing result of PolyCare's construction. In the meantime, the company operates its first factory in Namibia. "We produce material for one house per day and production line there", said Gerhard Dust. "We have hired 15 women and 15 men from the shacks next door to work for us. Our goal is that they can afford their own house when they have worked for us for two years." Besides this social sustainability, PolyCare's houses also meet the conditions of economic and ecological sustainability: "Our houses are 20 percent cheaper and cause 60 percent less carbon dioxide emissions than normal concrete buildings."

Two dominating topics

The issue of sustainability, which Gerhard Dust had introduced so impressively, was one of the two dominating topics of this year's European Chemistry Partnering Conference. The challenge of digitalization was the second one. "Digitalization will quickly change whole processes and lead to new business models", emphasized Michael Brandkamp, Managing Director of the Hightech Gründerfonds. "Sustainability is a bit slower but will have more impact on the industry because the value chains will change from fossil resources to biomass." Beyond that, representatives from all walks of chemical innovation were present, their scope ranging





from analytics to technology and hardware to Pharma and MedTech, from catalysts and enzymes to fine and specialty chemicals, from R&D services to new materials. For the first time, nine large companies presented themselves in 15-minute-lectures, so-called inversed pitches. The majority of the 104 start-up-pitches in four different rooms presented ideas, business cases and innovations, respectively, which were related either to digitalization or sustainability, the latter under the umbrella of the interdisciplinary topics water and chemistry, wood and chemistry, and energy and chemistry. Additionally, 55 exhibition booths attracted the attendees of the conference, and the 129 tables in the partnering rooms were almost constantly occupied and brimming with creativity. Furthermore, five sponsored one-hour workshops on current topics took place.

How can we generate value from chemical data?

Digitalization goes far beyond better process control and equipment management. It offers many new opportunities. Yet it also confronts the industry with the threat to be partially expropriated by platform companies. "The chemical industry knows how to monetize chemicals, but it does not yet know how to monetize the data associated with them. If they do not learn how to 'sell' their data, somebody else will do it for them".

With this warning, the Vereinigung Chemie and Wirtschaft in the German Chemical Society (GDCh), invited to discuss the opportunities and risks of digitization for companies and employees. In their workshop, they discussed strategic approaches for the chemical industry to appropriately deal with this business revolution. In addition, a panel discussion moderated by Thorsten Gressling, founder of Digital Chemistry e.V., had a look on more practical aspects of digital technologies that have already begun to change many industries, namely applications of blockchain, artificial intelligence, and big data. The panelists agreed that the wall between IT experts and chemists had to be torn down, so that in collaborative discussions there will be no further misunderstandings as

Marit Bading (TaylorWessing)

From left: Ivana Büttner and Pierre Büttner (VARIOKAN)


tnering Table
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Partnering Table
77

to whether, for example, API means application program interface or active pharmaceutical ingredient.

New business models to support sustainable chemistry

Innovators in the field of sustainable chemistry need more support than they currently get. To fulfil this unmet need, a new independent international institution called International Sustainable Chemistry Collaborative Centre (ISC_3) has been founded two years ago. Recently, it has launched a global service program for start-ups. This program was presented by ISC_3 representatives in another ECP workshop. It is targeting clients in the whole innovation chain, from discovery to business expansion. Initially it is publicly funded and is intended to remain free of cost. It offers three stages of support, depending on the client's sustainability efforts. During the closing session, Friedrich Barth, Managing Director of ISC_3, and Holger Bengs, Organizer of the ECP, announced to work together more closely internationally to connect innovators with investors in the field of sustainable chemistry. "We need new solutions from the chemical sector and therefore we need new business models. For this reason, ECP and ISC_3 will bring the different players together", said Friedrich Barth.

In search of circular solutions

A specific and increasingly important aspect of sustainability, the pollution of the oceans by plastic, was the starting point of the concluding panel discussion. According to a recent report of the World Economic Forum (WEF), moderator Stephan Haubold, professor at Fresenius Hochschule, opened the discussion, eight million tons of waste plastic were dumped into the oceans each year. "This is really sad. How can we solve this problem?"

Daniella Russo (Think Beyond Plastic Inc.)

Professor Magnus Nydén (Nouryon)

Dr. Paolo Bavaj (Henkel AG & Co. KGaA)

Daniella Russo, CEO and Co-Founder of Think Beyond Plastic, Inc., pointed out that in principle, there was nothing wrong with plastics. "They must not be equated with a cheap material that can be thoughtlessly discarded. We need to preserve the value of their molecules in a circular economy." The currently used materials, however, she said, were to a large part toxic, so the real big question was how to introduce new materials into this ever-increasing cycle. "Therefore, we have to innovate materials and chemicals on an unprecedented level and arrive at a plastic production with sustainably manufactured bio-derived materials with a sustainable end of life."

Magnus Nydén, Global Chief Scientist of Nouryon Holding, agreed. "We have to design molecules and materials from the beginning in such a way that they can be used in a circular economy. However, the cost-efficiency of such new processes is not competitive yet." Fernando Gómez, Head of Chemistry and Advanced Materials at the WEF, alluded to the "huge risk of oversimplifying the word plastic. We have to show the potential of this fantastic material". In order to build a new plastics economy, he recommended to engage all stakeholders. "A complex system like this needs multiple interventions at different points." ISC_3 Managing Director Friedrich Barth suggested that plastics "have all the potential to be circular. All solutions in different parts of the value chain are already there. The problem remains to clean-up what is already in the ocean."

Daniela Russo stressed that both innovation and cleaning-up called for an appropriate level of investment, a blend of substantial public and private engagement. To solve the problems with plastics, she advocated a mind-set, which was characteristic of the 3rd European Chemistry Partnering: "Think big, start small, and move forward."

Joachim Pietzsch, journalist

From left: Dr. Holger Bengs (BCNP Consultants GmbH), Hamid Nobari (Turkish Petrol Bilgileri), Ali Shakiba (Turkish Petrol Bilgileri) and Wolfgang Schmidt (axxana GmbH)

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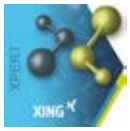

Regional Partner of 3rd European Chemistry Partnering

REAPING THE FULL POTENTIAL OF CHEMISTRY FOR SUSTAINABLE DEVELOPMENT

By Friedrich Barth

Every day, new data and media reports reveal the enormous global challenges humanity is facing: climate change, growing demands on scarce resources, plastic pollution of the oceans, to name but a few. Earth's natural systems resources are under unprecedented stress. Over 60 percent of ecosystems are depleted while consumption of natural resources is expected to rise three to six-fold by 2050. Only 9% of the 92.8 billion tonnes of minerals, fossil fuels, metals and biomass that enter the economy are reused annually while global use of materials is growing. It has more than tripled since 1970 and could double again by 2050. The Anthropocene epoch characterized by humanity's negative impact on the planet, is an era of waste.

To find solutions for the manifold challenges of our times, we need more than a clean and efficient economy. We need transformative ideas to create a circular, GHG-neutral society. Innovative chemical companies have the potential to tackle these challenges and transform products and production processes along the value chain. By designing solutions which enable a circular economy and climate-resilient societies, chemistry could be a key driver of sustainable development.

Transformative innovations and new business models

Start-ups play a key role in this process. By unleashing the power of creativity, they challenge the existing systems of chemical production and use. At the International Sustainable Chemistry Collaborative Centre (ISC_3) we promote sustainable chemistry innovation and connect innovators and investors from all regions of the world with science and policy makers. By supporting entrepreneurs and interlinking the different sectors and regions we want to inspire and promote sustainable solutions which meet the needs of our western societies as well as those of the developing world.

Customized support for sustainable chemistry Start-ups

To develop new business models and bring innovations to the market, the ISC_3 Innovation Hub at DECHEMA e.V. in Frankfurt, Germany, has set up the "ISC_3 Global Start-up Service", a customized programme to support Start-ups along the entire innovation chain.

Signing a Memorandum of Understanding: ECP initiator Dr. Holger Bengs and Friedrich Barth (ISC_3 - International Sustainable Chemistry Collaborative Center)

The service provides not only international support for innovators, it catalyzes and accelerates tech transfer from science to industry and between regions and countries. The service is designed to answer to the specific challenges of chemistry Start-ups. At the ISC_3 we know that turning ideas into marketable value is particularly challenging in the field of chemistry and related sciences. Long before innovators can think about marketing concepts they have to get through long research and development processes. Innovators in the chemical sector need special equipment and expensive lab space. To bridge the existing support gap, ISC_3 offers a broad variety of services for sustainable chemistry changemakers.

Support along the whole innovation chain

For inventors who are just coming up with an idea and want to turn it into an early stage innovation, ISC_3 offers mentoring, training and educational materials about entrepreneurship, business development as well as relevant market information. With our early stage support we reach out (can it please be appeal to?) to students, researchers and professional staff in research institutions. From there on, inventors with promising ideas receive further support from the ISC_3 to help turn their innovations into marketable value and novel business models. Entrepreneurs are invited to pitch at events, exhibitions and workshops and meet investors as well as leaders from industry, science and politics. Start-ups pursuing expansion and commercialization strategies receive customised support on accessing finance and prototyping infrastructure.

Awarding innovations for "Sustainable Building and Living"

The ISC_3Innovation Challenge invites innovators internationally to become sustainable chemistry changemakers. In 2019 the challenge will focus on new ideas and inventions in the field of "Sustainable Building and Living". Sustainable development cannot be achieved without significantly transforming the way webuild in, and manage, urban spaces. Enormous investment in new buildings and the renovation of existing buildings is therefore necessary to achieve adequate and affordable housing for a growing world population. Chemicals play an important role in modern buildings and can contribute to affordable housing in developing countries. However, on the way towards "Sustainable Buildings and living", many challenges need to be addressed: How can we substitute hazardous compounds in construction materials? How can chemistry-based solutions improve indoor air quality? How do we achieve GHG-neutrality through environmentally-benign materials? How can sustainable chemistry help to improve resource efficiency while enhancing recyclability? And what are the sustainable solutions for affordable housing? With this year's focus we have chosen a topic, where we see great potential for sustainable chemistry innovation.

Strong Partners on the way to the markets

At the ISC_3 we believe in the great potential of sustainable chemistry Start-ups to make our world a better place. To help them unleash their creativity and build a successful business, we work together with an international network of experts and partners all over the world. The European Chemistry Partnering (ECP) is one of our most valuable partners. We support the ECP to raise awareness for the transformative power of chemical innovation and engage with entrepreneurs, investors and experts from the innovation community to inspire,collaborate and support sustainable chemistry changemakers.

Friedrich Barth, Managing Director, International Sustainable Chemistry Collaborative Center (ISC_3)

The International Sustainable Chemistry Collaborative Centre (ISC_3)
ISC_3 is a new independent, international institution promoting and developing sustainable chemistry solutions worldwide. The centre manages a knowledge platform and a network of experts, offers training and support, and carries out innovation scouting activities. It is a partner for industry and politics as well as for society in general as well as academia and helps connect different stakeholders to jointly develop new solutions for biggest challenges of our times.
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The Winners

Among all participants who signed up for the ECP Newsletter by throwing their business card into the boxes, BCNP Consultants gave away five tickets for the 4th European Chemistry Partnering 2020.

Here are the winners:

Dr. Samuel Hess
UniSieve Ltd.

Dr. rer. nat. Christian Dohms
Dohms Consulting Business Development

Dr. Moayyed I. Al-Qurtas
Gulf Petrochemicals and Chemicals Association GPCA

Geert Sergoyne
GEMSOTEC bvba

Rune Koehn
Chembid GmbH & Co. KG

Drawing the winner: Friedrich Barth from ECP Double Diamond Sponsor ISC_3

ADDITIVE MANUFACTURING: THE COMBINATION OF FUTURE TECHNOLOGIES

Why the hype for Additive Manufacturing?

By Daniel Schreck

Additive manufacturing principles have the potential to partially replace conventional production techniques such as milling or turning and develop opportunities to create new values. In particular when combined with digitization and increased flexibility of large-scale industrial production right up to aligning production processes toward batch size 1, additive manufacturing processes offer options which traditional processes only provide to a limited degree. Generative technologies provide qualities which make them essential for implementing the 'Zukunftsprojekt Industrie 4.0' as part of the German government's high-tech strategy.

The current keen interest in the possibilities of additive production and the media attention since 2012 is primarily due to the convergence of two developments. Firstly, the manufacturers have improved the manufacturing and material systems to such an extent that they can compete with conventional production processes. They can now be utilized in direct component production for a whole host of market segments, meaning that, in part, traditional production has been replaced by the processes built upon.

Secondly, the expiry of a number of patents and property rights for a number of important processes such as filament printing in 2009 or laser sintering in 2014 has triggered a wave of development and a drop in prices which has made additive manufacturing attractive for end consumers. Between 2008 and 2011, the systems manufacturers in the low-cost sector achieved annual increases of 346 percent. Hundreds of new manufacturers of filament printers and desktop laser sintering systems have now appeared on the market.

Additive Manufacturing: A path toward individual production

Additive manufacturing is expected to play a crucial role in the context of the fourth industrial revolution. Not only the generative nature of these technologies completely revises the previous understanding of conventional subtractive manufacturing methods. Here, it is not just a case of saving resources and avoiding production waste; it is possible to produce product parts with the kind of complex geometries which would not be possible at all if conventional methods such as casting were used. But also, it combines different key technologies i.e. photonics, material technology, lightweight design and digitalization.

Experts assume that generative manufacturing will first establish itself as an addition to the existing production processes. Already today though, the large number of small-scale company foundations brought about by the further development of additive manufacturing processes is striking. Operating mini-factories with new business models and unique products has been made possible by 3D printing entrepreneurs in almost all larger cities. These entrepreneurs were also able to find the necessary capital on the internet and social media using crowdfunding campaigns.

This development appears attractive to countries which have permitted an enormous reduction of industrial production to make room for the service sector over the last few decades. Additive manufacturing technologies are recognized and perceived as the key for the re-industrialization of national economies.

The future potentials for Additive Manufacturing?

The generative manufacturing market is still manageable. It is seen as fact for a few application areas and industry sectors that there will be a transformation to involve a stronger use of additive manufacturing technologies. The speed of this transformation process is influenced by numerous factors. Above all, the often-necessary expense of post-treating components produced in additive manufacturing processes makes even more development efforts necessary.

More and more plant manufacturers are designing the processes and their material logistics for mass production. The products and areas of application most suited for additive manufacturing are currently the subject of

extensive discussions. Whether we will in retrospect attribute the character of an industrial revolution to the change remains to be seen. However, the market development over the last five years allows us to expect a large potential – especially for German and Hessian companies.

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Under the brand name "Technologieland Hessen", Hessen Trade & Invest GmbH combines technological innovations and promotes the development, application and marketing of relevant future and key technologies in Hessen on behalf of the Hessian Ministry of Economics.

To keep pace with the latest technological and social developments, it is important to keep an eye on individual technologies and to recognize synergistic effects. "Technologieland Hessen" presents the various key technologies in Hessen within specialist fields of expertise, called 'competence fields'.

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Daniel Schreck, Leading Project Manager Material Technologies in the Dep. Technology & Innovation at Hessen Trade & Invest GmbH

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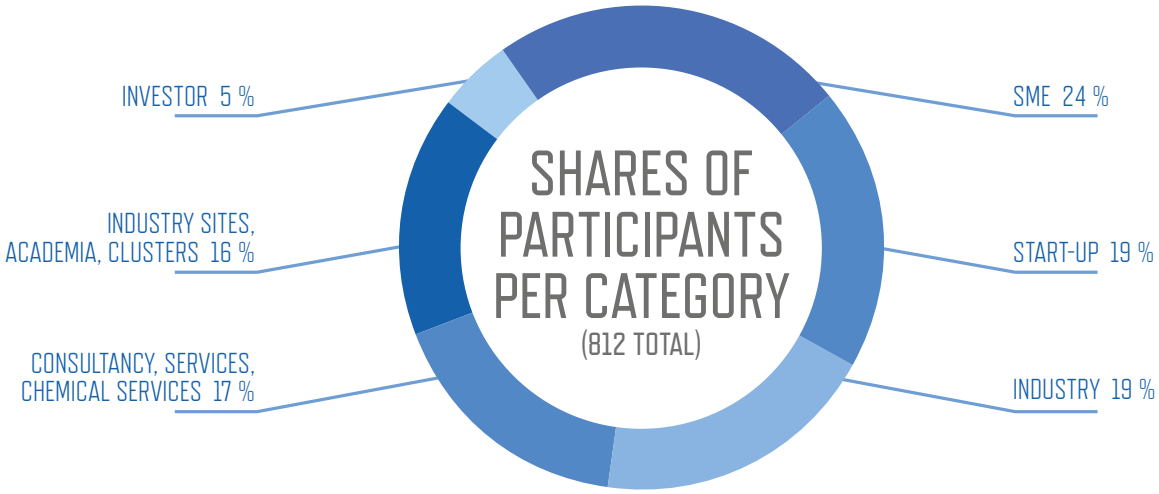

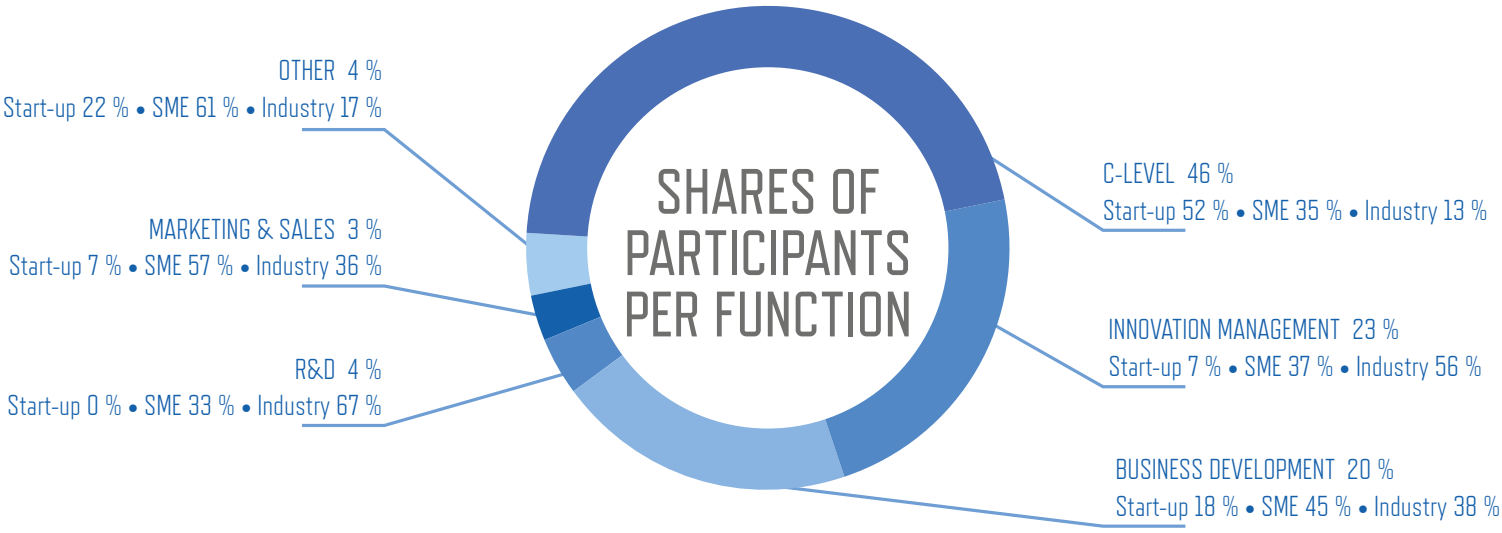

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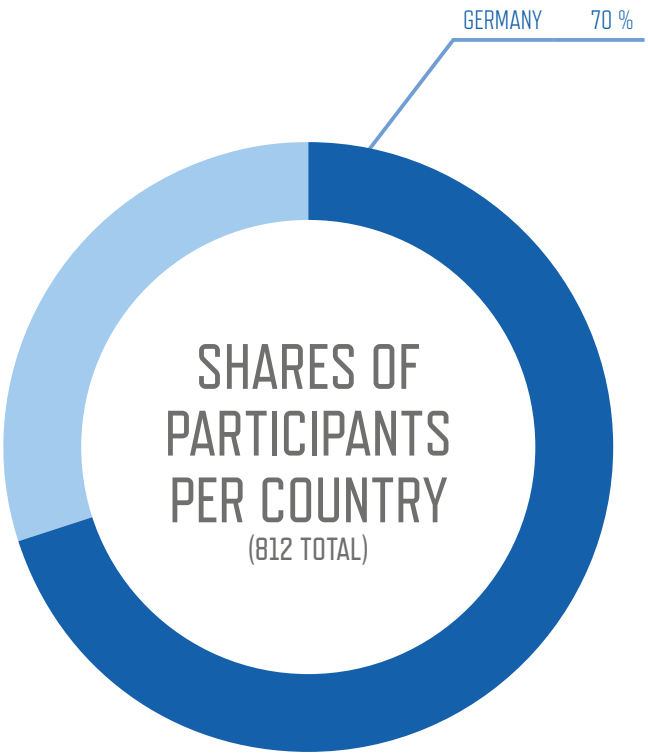
While 70 % of the participants came from Germany, 30 % of the participants have an international origin. The share of international participants breaks down as follows:

SWITZERLAND	15,2 %	SLOVENIA	1,2 %
NETHERLANDS	14,4 %	AUSTRALIA	0,8 %
BELGIUM	9,9 %	CZECH REPUBLIC	0,8 %
ENGLAND	7,4 %	ESTONIA	0,8 %
DENMARK	6,2 %	HUNGARY	0,8 %
FRANCE	5,8 %	INDONESIA	0,8 %
FINLAND	3,7 %	ISRAEL	0,8 %
LATVIA	2,9 %	LUXEMBOURG	0,8 %
PORTUGAL	2,5 %	QATAR	0,8 %
SPAIN	2,5 %	TURKEY	0,8 %
ITALY	2,1 %	BRAZIL	0,4 %
JAPAN	2,1 %	CROATIA	0,4 %
KOREA, REPUBLIC OF (SOUTH KOREA)	2,1 %	KANADA	0,4 %
		MOROCCO	0,4 %
RUSSIA	2,1 %	PAKISTAN	0,4 %
UNITED STATES	2,1 %	SWEDEN	0,4 %
CHINA	1,7 %	THAILAND	0,4 %
POLAND	1,7 %	UNITED ARAB EMIRATES	0,4 %
AUSTRIA	1,2 %		
INDIA	1,2 %	WALES	0,4 %
SCOTLAND	1,2 %		



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EUROPEAN CHEMICAL FINANCING VOLUMES WITH CATCH-UP POTENTIAL – GERMANY LAGGING BEHIND

By Marcel Lange

The international chemicals market is immense and one that is constantly changing, especially in terms of its composition. While just over 10 years ago, Europe and the US dominated the global market with a combined share of more than 50%, with Europe accounting for 27.5% and the US 23.5%. Nonetheless, these two former major chemicals powers have been outpaced by Asian competition and as of 2017 together only account for 30.6%. The strong industrial growth and competitive positioning of the chemicals industry in the Far East enabled Asia to grow and become the new major chemicals power with a market share of 61.7% in 2017 (up from 38.8% in 2007).

A look at the IPO market underlines Asia's fundamental strength: over the past 5 years, 1,574 IPOs were recorded across all industries – by comparison, only 830 European and 824 US companies went public. However, even more striking is the trend in chemical IPOs over the last 5 years: while respectively 12 chemical companies were listed in Europe and the US, Asia accounted for a remarkable 125 IPOs – almost 8% of all Asian IPOs are thus in the chemicals sector.

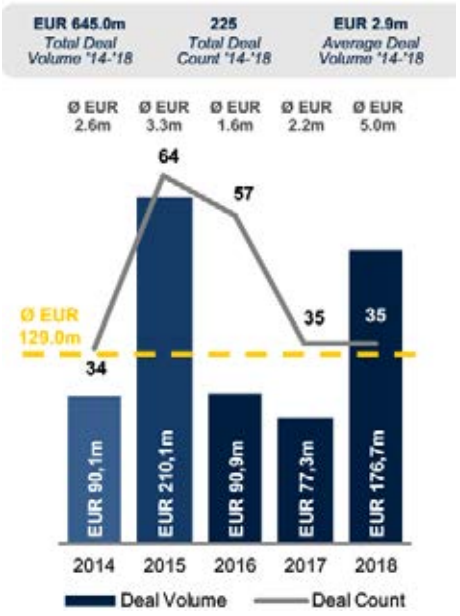
Albeit, the impression should not be deceiving: Europe is and will remain an extremely important market for chemicals. Over 1,400 chemical companies are headquartered on the "Old Continent" (excluding Russia). A total of 689 chemical companies alone are headquartered in the UK, Germany and France, which together account for 45% of all European chemical companies. With 241 chemical companies and a market share of 15% in Europe, Germany ranks 2nd behind the UK (with 279 companies and 21% share.)

Chemical companies trail their life science peers in the European Venture Capital market

Measured by the sheer size of the market, 1.1% of GDP in Europe is attributable to companies in the chemicals industry. The extent of Venture Capital (VC) activities in this area is, however, rather modest: the European chemicals industry accounts for merely 0.4% of the total VC market in Europe by capital raised.

Record highs were reached in 2015 in terms of total deal volume (EUR 210m) and deal count (64) in the European chemicals VC market. Over the last 5 years, the average volume of VC transactions of European chemical companies was merely EUR 2.9m, compared with EUR 9.4m for life science companies. Moreover, with an average annual VC deal volume of EUR 129m and a VC deal count of 45, the European chemicals market is significantly less active than the equivalent life science market that saw an average annual VC deal volume of EUR 2,066m and 219 VC deals.

In short, the chemicals industry is totally underrepresented in Europe, lagging behind the life science sector by about 10 to 15 years. Over the last 5 years, European life science companies have raised EUR 10.3bn in VC financing, starkly contrasted by the EUR 645m of VC financing raised by European



Top-5 Active EU Countries by Deal Volume (L5Y)

Rank	Target Country	Deal Volume (in EURm)	# Deals
1		284,2	93
2		117,3	24
3		96,0	9
4		42,9	12
5		23,2	11

Source: PitchBook as of 11/02/2019, FCF Equity Research

chemical companies. German chemical companies appear to receive less interest from VC investors. Over the last 5 years, 9.9% of the total European life science VC funding was invested in German companies, while only 3.6% of total European chemical VC funding was invested in German companies.
Although Germany has many chemical companies (ranked 2nd in Europe), it hardly plays a role for VC investors. Germany lags the dominant nations UK and France and does not even feature a Top 5 investor hub in Europe.

Top-5 European Investor Hubs by Invested Capital (L5Y)

Rank	Target Country	City	Invested Volume* (in EURm)	Top Investors
1		Paris	124,6	SOFINNOVA, ALVERAN, UNIGRAINS
2		London	70,2	CHANONIX, bgf, PARKWALK
3		Geleen	21,9	Brightlands Venture Partners
4		Oxford	21,7	OXFORD CAPITAL, oxford technology, woodford
5		Barcelona	21,4	URICA, CaixaCapitalRisc

Source: PitchBook as of 11/02/2019, FCF Equity Research

Post-IPO Performance of European Chemical IPOs (L5Y)

Company	Country	IPO +1M (in %)	IPO +3M (in %)	IPO YTD (in %)
amoeba		+28%	+146%	-71%
B·R·A·I·N		+12%	+1%	+28%
		+17%	+37%	+104%
		+148%	+132%	-2%
Elkem		+6%	+34%	-7%
Fermentalg		-6%	-24%	-68%
IBU tec		+17%	+5%	+3%
orion		-4%	-5%	+80%
PCC		+0%	-2%	+170%
polWAX		-1%	+8%	-52%
Serge Ferrari		+8%	+7%	-58%
VENATOR		+4%	+27%	-69%

Source: S&P Capital IQ as of 25/02/2019, FCF Equity Research

German IPOs convince with performance

After all, Germany is prominently placed in one category: IPOs. Only 12 European chemical IPOs exceeding a volume of EUR 10m were recorded in the last 5 years, 3 of which took place in Germany (representing a 25% share). Surpassing all expectations, even by international standards, the mega-IPO of Covestro, Bayer's plastics subsidiary, raised EUR 1.5bn in 2015. Yet this IPO distorts the picture significantly. If one excludes Covestro from the analysis, 2015 was even a below-average IPO year in Europe.

On closer inspection, however, the German IPOs reveal one thing: a strong performance. In other words, it can be worthwhile for investors to subscribe to German chemical IPOs when they come to market. The 3 German IPOs were the only offerings in Europe that consistently delivered strong average returns of +15.4%, +14.2% and +45.1% over a 1-month, 3-month and IPO-YTD horizon, respectively. Not least these figures suggest: the reluctance of investors in the chemicals sector, especially in Germany, is unfounded and perhaps even irrational in the long-term. This leaves room for hope and catch-up potential for the German chemicals market.

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Marcel Lange, Vice President of
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CHINESE INVESTMENTS IN THE EUROPEAN BIOTECHNOLOGY SECTOR

By Peter Homberg

The number of investments involving Chinese investors and targets in Europe has continuously increased in recent years. Chinese foreign direct investments in Europe hit a record of EUR 65 billion in 2017, compared with less than EUR 2 billion in 2010. Despite a decrease in this amount in 2018 the underlying progressively increasing trend of Chinese investments in Europe is, however, economically stable.

Nevertheless, it is not uncommon for transnational transactions between European targets and Chinese investors to fail due to cultural and communicative differences.

The interests between investors and targets are sometimes very different. While Chinese investors will be looking for a high return on their investment, the German authorities often fear a sellout of German high-tech industrial stocks. Although foreign investments fuel growth, innovation and employment, German biotechnology companies have a special interest in the continuation of the company in Germany.

Legal hurdles have to be overcome

Legal hurdles for investing in Europe are first of all China's outbound investment rules. Chinese investment projects abroad are subject to prior review and approval by the competent authorities, which can lead to negotiations being extended for several months.

In Germany, the investments in certain sensitive areas are subject to additional reporting obligations. Some of them have to be examined and may be prohibited by the authorities.

The European Union is also expanding its foreign inbound investment rules having started negotiations about putting in place a EU-wide framework for screening foreign direct investments. After the European Parliament gave its support for the proposed European framework in February 2019, the Regulation will enter into force once the Council also has given its approval.

Cultural differences are still significant

Furthermore, soft factors such as cultural and communicative aspects must also be taken into account.

While German corporations often let their lawyers negotiate, Chinese decision-makers often participate in the negotiations themselves. Points already negotiated are therefore often renegotiated during the process.

Regarding communicative aspects, modesty and restraint are highly important in Chinese conversation. Chinese business partners often cover up what they really think, whereas in Germany, problems as well as positive aspects are communicated directly.

A practical solution to overcome those challenges is above all a good and careful preparation of the negotiations beforehand. In order to maintain respectful behavior, cultural particularities should be sensitively observed. Overall, the support by a team with experiences in dealing with Chinese investors should be used in order to take account of the various aspects of such cross-border transactions and to overcome them.

Peter Homberg, lawyer and partner of Dentons in Berlin, Head of the German Life Sciences practice and Head of the European Cannabis Group. He advises pharmaceutical, medical device and chemical manufacturers and biotechnology companies, in particular on research and development agreements, cooperation agreements, cross-border IP licensing and IP strategies, M&A transactions and on compliance matters.

MOVING TOWARDS A CIRCULAR PLASTICS ECONOMY

By Richard Haldimann

In view of the vast amounts of plastic waste leaking into the environment, there is a clear need for more sustainable and recyclable product solutions to speed the implementation of a true circular plastics economy. In an encompassing approach across the entire value chain of plastic products, innovative additives can make a significant contribution.

Due to their strength, light weight and versatility, plastics have become ubiquitous and indispensible to meet basic human needs of food, shelter, motion and health. Better plastic packaging has dramatically reduced food waste. Light-weight plastics help save fuel. And plastics have increased the durability of products in many aspects of modern life. Therefore, the annual demand for these materials has risen to far over 300 million tons. Unfortunately, much of the produced volume is lost after only one single use cycle. Each year, about 200 million tons are disposed in landfills, and about eight million tons leak into the oceans uncontrolled.

Understanding sustainability

Consumer awareness of the plastic waste problem has become very high and sustainability a megatrend in many industries which is driving brand owners and consumer-facing manufacturers to make strong commitments. Additionally, legislation around the world is increasing the pressure on industries to reduce plastic waste. More and more companies are accepting responsibility for their products beyond the markets they serve, for instance by raising the volume of recycled materials in their production and introducing design-for-recycling schemes.

Arguably the most important success factor for introducing sustainable products is a common, easily understood and verifiable definition of sustainability. This requires transparency and collaboration across the value chain, industries and disciplines to ensure compliance, and to develop a seamless easily understood story line to bring to the end consumer and build understanding and trust. A chemical company must understand how its products are being processed to help create sustainable applications that can be recycled more easily.

For Clariant this has become the lens through which we look at any new business opportunities. As a partner in various initiatives such as the Circular Economy Initiative Deutschland, we seek to succeed with additives that make a significant contribution to both the profitability of our customers and the environment, from water-borne paint stabilizers to zero-VOC/SVOC masterbatch compounds under our certified EcoTain seal.

Facilitating the Recyclability of Plastics

Additives are used to enhance a wide range of processing as well as in-use properties of plastics but can complicate the recycling process. Therefore, some stakeholders are demanding more severe regulations targeted at reducing or even eliminating the use of plastics containing additives.

However, with innovative additives customized to increase the durability of plastic products and facilitate their recycling, we can reduce the consumption of valuable raw materials while at the same time reducing waste. Moreover, if taken into consideration in the "design for recycling" process, additives have a great potential for helping plastic suppliers develop material solutions that are a lot easier to separate, recover and reuse - solutions that may eliminate the need for complex material mixes or reduce the required number of different materials in multi-layer structures.

Such materials are already available today that improve material properties with the aim of enabling high-performance follow-up applications in a more circular plastics economy. For instance, chain extenders are used to repair polymer chains from damages suffered in the recycling process. Other additive based solutions, such as near infrared (NIR) transparent black, support the identification of specific plastics in sorting plants in order to receive clean-grade material streams.

Addressing the issues together

While we want to sell and apply our products, we also consider potential new business models. There are a lot of things that individual businesses could do, but we believe that an

over-arching business approach addressing the entire plastics value chain from the raw materials to recycling holds more effective and lasting solutions. The challenge is to rethink the design and formulation of plastics for a circular economy and scout for breakthrough technologies.

For this reason, we have investigated this topic in our iGarage, a space designed to bring together experts from within the company as well as from outside in teams with a mission to focus on singular challenges. By leveraging methods such as design thinking and lean start-up tools they come up with new insights and approaches. The main point is to gain speed in our common drive for a circular plastics economy. iGarage allows us to tackle challenges that are more complex and uncertain but also more rewarding.
Overall, we have prioritized four specific concepts to turn plastics recycling into a viable business model:

- Mechanical recycling by means of sorting, washing, cutting and re-extrusion, with special pigments to improve sortability
- Chemically enhanced recycling, using process agents, additives and materials designed for recycling, addressing particularly the needs of carpet and multi-layer materials recycling
- Recompounding by way of de- or reverse polymerization using catalysts
- Gasification of plastic waste into syngas and/or pyrolytic heat treatment to crack the polymers and create feedstock for new, virgin-like high-performance plastics

A fifth alternative, i.e. energetic recycling by incineration, has explicitly been excluded from the list. The overall target of our pro-active initiatives in developing these concepts is to speed the implementation of a truly circular plastics economy throughout all industries and application areas – with innovative additives as a key driver along the way.

Dr. Richard Haldimann,
Head of New Business Development, Clariant

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„A DAY LIKE THIS IS FANTASTIC“

Successful Premiere of the ECP Summer Summit

By Uta Neubauer

53 pitches, 606 partnering meetings, countless contacts – 250 participants from 16 countries met at the first Summer Summit of the European Chemistry Partnering on September 25, 2018 at Henkel HQ, Düsseldorf.

Be it a necessary change of raw material provision, increasing competition from the Far East, or the ongoing digitalization – Europe's chemical industry is changing and it relies increasingly on the innovative spirit of start-ups. „We are looking more and more outside the company“, said Paolo Bavaj, Head of Corporate Venturing Adhesive Technology at Henkel in Düsseldorf. On September 25th, he didn't have to look very far, as the first Summer Summit of the European Chemistry Partnering (ECP) took place at Henkel HQ in Düsseldorf. The meeting supplemented the annual ECP February events.

In more than 600 partnering meetings arranged online as well as in numerous conversations at the exhibitors' stalls in the Speaker's Corner or simply over coffee or lunch, the 250 participants exchanged ideas and initiated co-operations. "Building networks, maintaining contacts – the personal conversation remains extremely important even in the times of new media," emphasized Oliver Rhode, founder and CEO of the German start-up Xenops Chemicals, who had already visited the ECP meeting in February 2018. This time, he made sure to leave some space between the 20-minute partnering meetings in order to be able to visit at least some of the 53 innovators' pitches of six minutes length, which took place in parallel.

When three times 1 is 111

The ECP format continues to be a recipe for success. „We are not a trade fair, not a congress, but a platform for the solutions of

ECP Summer Summit Host Dr. Paolo Bavaj (Henkel AG & Co. KGaA)

tomorrow where three times 1 is not 3, but 111", as ECP host Holger Bengs, CEO of BCNP Consultants, said when he welcomed the participants: „Go out and turn your innovation into a masterpiece!"

Somebody who knows very well how that works is Wolfram Stichert, CEO and cofounder of hte, the high throughput experimentation company based at Heidelberg. In his keynote lecture, he set the tone for the meeting by revisiting the history of his company. Since 2008, the company, which specializes in catalysis research and catalyst development, is a 100% subsidiary of BASF. However, as Stichert explained, „BASF did a very good thing, they left us alone for a little bit. We are acting like an SME."

Surely, many things become easier when you've got the right partner – and there are many other ways apart from acquisition or financial investment. The Dutch company Buchem helps start-ups to close the gap between laboratory synthesis and industrial scale production. "At the ECP in February 2018 we initiated a project for the production of a new nanocatalyst which we have managed to finalize just now," reported Mathias Guggisberg, who is in charge of Sales and Innovation at Buchem. At Düsseldorf, too, they had very good talks, he added: "People are coming together to create something new."

Ralph de Haan, CEO and cofounder of Kemgo, a company that was founded in 2015 and supports the chemical industry in its digitalization efforts, was equally enthusiastic: "Here I can meet the decision makers. This is essential for us, because decisions regarding digitalization are made on the top floor." Kemgo has offices in Germany, the US, and China. De Haan's goal: "I want to make the European chemical industry more receptive for digitalization. Otherwise, there will be the risk that Asia and the US will leave us behind."

Just like previous ECP events, the ECP Summer Summit can boast an unusual diversity of topics. In the pitches alone, the palette included subjects from graphenes for material reinforcement (presented by The Sixth Element from China), via pilot plants for the bio-economy (Bio Base Europe Pilot Plant, Belgium) through to artificial intelligence in the lab (ARS Computer and Consulting, Germany). Carsten Beyer, Head of the Computational Life Science Portfolio at Bayer's Crop Science Division, has already taken part in many partnering events in the biotech sector, especially in the US. He is glad that at ECP offers more diversity: "Here we're not left to stew in our own juice. This suits us, as we like to look beyond our boundaries."

Daniel Wauben (ChemCologne e.V.) and Gesche Weger (Packwise GmbH)

Rong Wang (EGGXPERT B.V.)

Prof. Dr. Bob Tooze (Drochaid Research Service Ltd.)

Meetings at eye level

Part of the inspiring, almost amicable atmosphere at the ECP Summer Summit was that all participants, no matter whether they came from start-ups, big industry, or investors, met each other at eye level. "A partnership always has to be a win-win situation," as Paolo Bavaj emphasized at the start of the event. During the final panel discussion, he criticized that many technology start-ups are bought up by big companies too early. Asked by discussion leader Patrick van der Meer from the Dutch Brightlands Innovation Factory whether a sufficient number of start-ups exists in the chemistry sector, Bavaj replied: „The sheer quantity of start-ups is meaningless. It is always quality against quantity. The European Chemistry Partnering helps to move to a higher level of quality." Joost Waeterloos, European Technology Scouting Leader at The Dow Chemical Company, cautioned: „A lot of start-ups are not able to define what kind of problems are to be solved. They should be able to say in one sentence where they are creating value."

Panel member Marie Westphal, Chemistry Platform Manager at the German Startups Association provided words of encouragement: „Use these kind of events. Go and meet people, tell them about your business and share business cards together. Don't be shy and say yes to the world." Also on the panel was Mary McCarthy of the Dutch start-up Boostani, who did just that: „I have spoken to so many people. A day like this is fantastic."

The 4th European Chemistry Partnering will take place on February 27, 2020 in Frankfurt, Germany.

Uta Neubauer, science journalist

Closing Panel, from left: Marie Westphal (Bundesverband Deutsche Startups e.v.), Dr. Joost Waeterloos (The Dow Chemical Company), Dr. Mary McCarthy (bosstani solutions B.V.) and Dr. Paolo Bavaj (Henkel AG & Co. KGaA)

2nd ECP Summer Summit 2019

European Chemistry Partnering

Düsseldorf
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THREE QUESTIONS FOR ...

Dr. Michael Brandkamp, Managing Director, High-Tech Gründerfonds Management GmbH, Germany

What do you like especially about the ECP?

This is a meeting of the important movers of the sector, the innovative start-ups on one side and investors and big industry on the other. This creates an ideal basis, because the big companies are customers of the small ones, but also co-operation partners in R&D projects. The investors provide the fuel which the start-ups need to get ahead.

Are you taking part for the first time?

No, we were already involved in ECP2017. That was a smaller event, almost like a family gathering. The second was already very professional and quite large. We are very enthusiastic about this development, because start-ups in chemistry need this kind of platform.

Is the chemistry start-up scene changing?

Yes, the number of new companies has increased quite a lot over the last few years. However, there is still potential for further growth. We need good role models and networks as well as investors that can set signals. Events like the European Chemistry Partnering encourage founders to get going.

Stefan Urth Nielsen, Industrial PhD Student, RadiSurf ApS, Denmark

What is RadiSurf working on?

We develop next generation adhesive layers for binding plastic to other materials in a new, strong and very smart way.

What did you expect from the ECP Summer Summit?

We had very high expectations because we were able to set up partnering meetings with interesting people and companies. And it has been very fruitful. We got in contact with the right people from the chemical industry, but also from consultancy and investment. That is a really good mix of what start-up companies as Radisurf in particular need.

Is there any event like this in Denmark?

No, even the chemical industry in Denmark is not as strong. So we need to go abroad. The European Chemistry Partnering was a perfect fit for us, a very positive experience and much better than many other events. The partnering was very efficient, really head-on, not like talking around. We really recommend it to others in the chemical and material industry.

Ann-Kathrin Kaufmann, Project Leader, BioCampus Straubing GmbH, Germany

Why do you take part in the ECP Summer Summit as a BioCampus representative?

We want to bring the life science economy to our location, to our innovation center. We are also launching a founders competition in this sector. This involves many start-ups in search of partners, and we help them scouting at this event. For us, ECP is the perfect forum, as both the small innovative companies and the big ones are coming together.

Did you have fruitful talks?

Just to give two examples out of many: We have spoken to one start-up that takes part in our competition but which we hadn't met before. Now we are in a better position to establish what they need and what we can offer them. Also, there has been an exchange with another cluster that could turn into a co-operative project.

Will you come again next time?

Yes, definitely. We were already at Frankfurt in February 2018, and we will come back next year, because this format doesn't exist anywhere else.

Dr. Michael Brandkamp (High-Tech Gründerfonds Management GmbH)

Dr. Stefan Urth Nielsen (RadiSurf ApS)

Ann-Kathrin Kaufmann (BioCampus Straubing GmbH)

Professor Robert P. Tooze, Managing Director, Drochaid Research Services Ltd, Scotland

What is your business model?

Drochaid is a recently established contract R&D company. We emerged in the closure of a larger corporate lab so we come from the opposite direction to many others at the meeting: We have not been small and then grown big, we come from a large corporate environment.

Why are you here?

We are new, we started trading in January 2018, so we need to get our name out there. I want to meet people and to tell them about our company. This is a good forum to do that. We met with representatives of various big and small companies, ones that we haven't talked to before. Even them knowing that we exist is a good thing and if that turns into projects and customers, it's even better.

How did you hear about the ECP Summer Summit?

We heard about this from Scottish enterprise, which is Scotland's main economic development agency, and also from the Industrial Biotechnology Innovation Centre based in Glasgow. We actually heard from two sources which convinced me that it must be a good thing.

Manuel Román, Director, Envirohemp S.L., Spain

What is your company's vision?

We are developing a breakthrough technology to force superactivated carbons to be included in supercapacitors for energy storage.

How did you hear about the ECP Summer Summit?

As we are coordinating a European research project, we got the idea from one of the project officers in the European Commission. We decided to come and to understand this ecosystem, which we do not have in Spain, where the chemical industry is not that big.

Does the event measure up to your expectations?

We have made very nice contacts, some of them operating on a scope similar than ours, others that could be potential new partners for the future. We are interested in the perspective of big companies towards innovation, towards new processes and products that enter the market. And we also want to learn from entrepreneurs and start-ups who have gone through the process that we are now in. So far it was very interesting.

Manuel Román (Envirohemp S.L.)

Prof. Dr. Bob Toozes
(Drochaid Research Services Ltd.)

LISTENING, LEARNING, DEBATING: FUTURE-BUILDING IN ACTION

For the first time, European Chemistry Partnering hosted different workshops organized by participating companies. The new format was well accepted and added new content and energy to the event.

By Matthias Heitmann

Innovations do not always consist of major leaps but often involve developing existing ideas further. In that sense, by introducing this new format the European Chemistry Partnering is clearly being innovative. "The workshops addressed topics related to industry, to politics and to society", said Holger Bengs explaining the new format. The discussions were not about spreading and listening to good news and positive figures but about actively shaping the future by open exchange and debate and by highlighting what the industry needs to do.

Catching up in finance

In his workshop "Strategic finance in Life Sciences & Chemistry", Arno Fuchs, CEO of the Munich based FCF Fox Corporate Finance GmbH provided insights into the financing opportunities for companies in the chemical and life science industries. Finance models in the life sciences were compared to those in chemistry with special emphasis on the situation in Germany. From Fuchs' point of view, the chemical sector is totally underrepresented and up to 10 to 15 years behind in the venture world.

Arno Fuchs (FCF Fox Corporate Finance)

Fuchs suggested that institutional providers such as the European Investment Bank (EIB) could be interesting partners for venture dept financing. With only twelve IPOs over the last five years the European Chemical IPO market shows relatively low activity, he said. However, Fuchs made it clear that there is room for improvement when it comes to financing.

Staying on top technologically

The workshop "Additive Manufacturing. The Hessian point of view" hosted by Daniel Schreck of Hessen Trade & Invest GmbH emphasized the role of what has so far been referred to as 3D printing and its relevance for the fourth industrial revolution. Felix Wendt from Fiberthree GmbH and Jan Giebels from Conspir3D GmbH gave an overview of the different variants of additive manufacturing and presented both new materials and a variety of printer systems.

Felix Wendt kicked-off the debate by asking "Why don't you print already?"

Daniel Schreck (Hessen Trade and Invest)

hitting the nail on the head: Of the approximately 25 participants, only two had had experience with the subject. Wendt explained various techniques before focusing on Fused Filament Fabrication (FFF.) Jan Giebels addressed the challenge companies face in finding the right FFF printer. Like every new technology, 3D printing still has its pitfalls: "Lots of things have the potential to go wrong," he said, but at the same time he had a solution at hand: with sensors that can record material flow into and out of the nozzle, temperature and other quality assurance tools, such problems can be solved.

Using modern technology to innovate yourself

The workshop "Digitization in the Chemical Industry: Opportunities and Risks for Companies and Employees"

hosted by Dr. Joachim von Heimburg and Prof. Dr. Klaus Griesar, both board members of the Association for Chemistry & Economics (VCW) at the Society of German Chemists (GDCh), addressed another highly controversial topic: For them, understanding the importance of digitization and its consequences for the chemical industry is only just beginning. Von Heimburg emphasized the need for innovative digital business models: Missing out on fundamental changes will mean that other players will jump in and use achievements, knowledge and industry data for their own benefit.

Dr. Klaus Griesar (Vereinigung Chemie und Wirtschaft – VCW)

Both speakers pointed out that there are great opportunities for the chemical industry– once it has understood the mechanisms and abandoned old ways of thinking. Data was described as "the new oil", and as the industry produces data anyway, the challenge now is to use it differently.

Adopting an open mindset about Start-ups

In his workshop "Go Silicon Valley: Accelerators as innovation vehicles for chemistry", Hubert Moik, co-founder of Go Silicon Valley e.V. explained how he provides Start-ups with opportunities by firstly mentoring and then actually taking them to Silicon Valley as potential targets for pitches. What the industry can learn from Silicon Valley is that openness and diversity are key to success and that you should never close your eyes and ears when someone tells you something completely crazy – it might just work.

Moik suggested that working with professional accelerators is an option that offers new possibilities for chemical companies. Whereas corporate accelerators are strongly business-oriented and bound to established big companies, independent accelerators have often developed their own industry specific profile, focusing on the success of the business model of the Start-up itself. Neither type of accelerator are common in Europe yet. However, Moik observes positive trends: "More and more companies have started operating their own innovation labs and accelerator programs."

Hubert Moik (Go Silicon Valley e.V.)

Supporting innovators to overcome barriers

In the workshop "ISC_3 Global Start-up Service for sustainable chemistry innovators", Dr. Friedrich Barth and Dr. Alexis Bazzanella explained the global service program for Start-ups of the new and independent International Sustainable Chemistry Collaborative Centre (ISC_3) whose aim it is to support innovators in the field of sustainable chemistry. In targeting the whole innovation chain, ISC_3 aims to supply Start-ups with creative solutions. Only a few months after its start, the program has already been considered by 40 companies worldwide.

Dr. Alexis-Michael Bazzanella (ISC_3 - International Sustainable Chemistry Collaborative Centre)

Given that lab space is an important cost issue for Start-ups, ISC_3 are about to launch a kind of Airbnb model for lab space by identifying unused space and matching this to market demand. As Bazzanella said in the discussion, ISC_3 consciously does not use a specific definition of sustainable chemistry. "More important than a definition is to move in the right direction."

Matthias Heitmann, journalist

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PLASTIC IS FANTASTIC – IF WE THINK RECIRCULAR

"New Plastics Economy" at the 3rd European Chemistry Partnering (ECP)

By Uta Neubauer

The first World Chemistry Forum in frame of ECP took place on 26 February 2019 in Frankfurt am Main and marked the conclusion of the 3rd European Chemistry Partnering. The discussion was dedicated to the New Plastics Economy and thus focused on one of the biggest challenges of the future: How can we ensure sustainable use of plastics and yet solve the problem of plastic waste? Members of the panel were: Daniella Russo (CEO, Think Beyond Plastic, Inc), Professor Magnus Nydén (Global Chief Scientist, Nouryon Chemicals Holding B.V.), Dr. Fernando J. Gómez (Head of Chemistry and Advanced Materials Industry, World Economic Forum) and Friedrich Barth (Managing Director, International Sustainable Chemistry Collaborative Centre, ISC_3.)

Plastic is found in clothing and packaging, computers, automobiles, toys and many other things. And this has implications: Eight million tons of plastic waste has already amassed in our oceans, but according to the Ocean Cleanup Initiative, only three tons can be removed from the oceans every week. With these depressing facts, moderator Stephan Haubold, Professor and Dean of Economic Chemistry at the German Fresenius University of Applied Sciences, introduced the panel discussion "New Plastics Economy".

"You have to stop this, there is nothing wrong with plastic," Daniella Russo responded. "It helps us to preserve natural materials like cork, leather or silk." But at the same time, she made it clear: "We can no longer continue in the same way." With Think Beyond Plastic, the innovation hub she founded, she is driving the commercialization of innovations and technologies for the New Plastics Economy.

Moving towards the circular economy

The recycling of plastics usually means downcycling, explained Russo, and the incineration of plastic waste releases those toxic chemicals into the atmosphere, that are used in plastics production. In the future, closed material cycles could be the solution to this problem. Magnus Nydén from the specialty chemicals company Nouryon furthermore emphasized "We have to think recircular!" For him, the circular economy means designing molecules and materials from the beginning so that they can be used in a circular way. Plastic in general has all the potential for a circular economy, as Friedrich Barth added: "But we need new plastics which are more easily recyclable."

Some things simply have to be prohibited. Barth was rewarded by applause when he stated: "Micro-plastic in shampoo is complete nonsense." Since the advent of industrialization, mankind has so massively changed the natural environment that some experts even propose that the most recent geochronological epoch should be referred to as the Anthropocene period. "However, if we continue like this they may finally call this the 'Plasticocene'. The sediment layers will be full of plastic", said Barth and nevertheless spread some optimism: "We know how to deal with it. The solutions are already out there."

The 1st World Chemistry Forum is being announced

EUROPEAN CHEMISTRY PARTNERING

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youtu.be/TnzfP-1Aj1A

WORLD CHEMISTRY FORUM

Fernando Gómez of the World Economic Forum stressed that we are at risk of an oversimplified and polarizing narrative about solutions. As examples, bio-based or biodegradable plastics are often offered as a go-to alternative, but their deployment by itself will not be sufficient to solve the problem. More rigour is needed to explain to the public that biodegradability, for example, does not automatically mean that plastics and their degradation products disappear completely from the environment. The mechanisms need to be examined in much more detail, said Gómez. Furthermore, the cost-efficiency of the production of plastics from renewable raw materials leaves much to be desired. The production of plastics from crude oil, which has been greatly optimized in recent decades, is now proving to be problematic, said Nydén. This calls for the support of consumers, whose rethinking is just as important as that of manufacturers.

Cooperation and investment are key

Scientists and industry representatives, consumers, investors and politicians – all need to work together to make the transition to the New Plastics Economy a success. Gómez stressed the need for cooperation at all along the value chain. The challenge remains complex and therefore requires complex multiple interventions by different stakeholders at different points. He evaluates the developments of the past few years positively: "We see a number of coalitions that are benefitting from a dialog approach and from bringing different stakeholders to the table."

Russo's message at the end of the discussion was short and sweet: "Think big, start small, move fast and break things." At the beginning, she described the relationship between society and plastics as a love affair. After the discussion it was clear: the protagonists on the panel as well as the audience still cling to this love despite the downsides and try their utmost to ensure that the good relationship will last for a long time – but without causing further damage.

Uta Neubauer, science journalist

EUROPEAN CHEMISTRY PARTNERING

The panel discussion, from left: Moderator Prof. Dr. Stephan Haubold (HS Fresenius gGmbH), Friedrich Barth (ISC_3), Dr. Fernando Gómez (World Economic Forum) and Daniella Russo (Think Beyond Plastics Inc.)

WHY 3D PRINTING WILL TRANSFORM MANUFACTURING

By Paolo Bavaj

Whatever you want, wherever you are, whenever you need it: 3D printing is driving a revolution in the way products are made. As the technology improves, more and more industries are taking advantage of this innovative process – and exploring how to transform the future of manufacturing.

For traditional manufacturing, scale has always been important: Huge numbers of products are made on massive production lines in factories before being put into large containers, stacked onto giant ships and transported to customers around the world. This keeps the cost of a single product low, but also involves high costs related to storing large amounts of stock – and major problems when shipping gets delayed. Traditional manufacturing also limits the options to customize parts and produce smaller lot sizes.

This obsession with scale has been at the heart of manufacturing for decades, but now a new technology is aiming to change this model – 3D printing! This revolutionary process has the potential to enable manufacturers to make whatever they want, whenever they want it, at what scale they want it, and at a location much closer to the final customer. This would shrink the cost of storage and transport, while also expanding the complete freedom to customize designs down to the smallest detail – from sneakers that are made to fit the unique measurements of your feet, to a fully personalized interior for your car.

Big impact for small objects: Design, print, prototype

In the past years some high-profile projects, such as a mobile conference building in Amsterdam with a partly 3D printed façade, attracted the public because of their impressive size. However, some of the most exciting breakthroughs related to 3D printing involve much smaller objects. For example, many manufacturers are already taking advantage of the technology to create prototypes of small parts and components. Therefore, 3D printing eliminates the need to have the prototype made by an injection-molding company and helps save time and money. With 3D printing, manufacturers simply open a digital design file and click print. Within a short time, they have the prototype in their hand. In fact,

Congress building with partly 3D printed facade

3D printing is already being used for functional prototypes: This means the prototypes can immediately be used to perform the intended function of the component – giving manufacturers a clear understanding of whether their design works or still needs to be refined. This means that 3D printing will soon be able to replace selected traditional production processes.

It's all about customization

Some experts think the technology may one day go even further and completely replace an entire production process. The greatest potential for this transformation lies in manufacturing small batches of small products. Shoes are one example: You might wear a size 42 from one brand and a 43 from another, or have one foot slightly larger than the other. With 3D printing, consumers could soon be able to order shoes that are customized to fit the unique size and shape of their feet! The medical sector also offers exciting potential applications for 3D printing: Clamps, pins and sheets of mesh used during operations could one day be created to fit the patient exactly, which would increase comfort while also cutting waste.

Strong innovation ecosystems for the next industrial revolution

Partnerships and collaborative research activities related to 3D printing are being set up across a broad range of industries in order to build strong innovative ecosystems – bringing together innovative players with vastly different expertise and experiences. These partnerships aim to explore customized technologies that enable simple, fast and automated digital production processes based on 3D printing for car parts, footwear, medical devices and much more. The expertise of partners ranges from software and printer companies across material suppliers, service companies and specialists in post-processing technologies. Today nearly all 3D printed parts require manual finishing once removed from the printer to enhance the quality or to add specific functions

To further drive 3D printing beyond functional prototyping towards the production of final parts, the technology obviously needs to be automated. In addition, collaborations alongside the additive manufacturing value chain need to be further strengthened and aligned. Successful innovation ecosystems need to combine the expertise of diverse partners. This not only includes mature partner companies since start-ups often play an important role as innovation drivers in fast-growing emerging markets such as 3D printing. They have the ability to develop new technologies and know-how that corporations often cannot develop themselves. Thus, Corporate Venture Capital is an important tool for companies to access new markets and gather insights about complementary technologies they could later onboard. Startups are also an appropriate tool for corporations to access and try new innovative – and very often digital – business models. At the same time startups not only benefit from the investment but also from gaining access to a broad customer base, upscaling expertise, know-how on IP strategies, and a larger R&D infrastructure. This helps startups to scale much faster than without a strategic investor, which also helps the corporations explore and participate in businesses they couldn't develop on their own.

Dr. Paolo Bavaj is Head of Corporate Venturing at Henkel Adhesive Technologies. The Henkel business unit is driving end to end 3D printing processes for final parts production – through materials expertise, technology partnerships, tailored solutions and customer access.

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"THE ECP IS A RAPIDLY GROWING, INNOVATIVE CHEMISTRY COMMUNITY."

Holger Bengs, the initiator of the European Chemistry Partnering discusses the history and future of ECP

ECP Journal: Holger Bengs, do you know what you were doing on 7 October, 2016?

Dr. Holger Bengs: (laughs). Ah, so you were paying attention during the preliminary talk. I see where you want to go with this. That was the birthday of the European Chemistry Partnering. At that time we didn't even know the baby's name. I was sitting with David Eckensberger from Hessen Trade and Invest and then there was this Big Bang. The Hessian Economic Development Corporation was looking for a concept for an event based around the chemical industry and they even had a budget; I had no budget, but a big idea. I searched my network and quickly found a partner (the Frankfurt Chamber of Commerce,) who offered us a location and then, on 16 November, the marketing activity began. We had exactly three months. It was overwhelming. Unfortunately, we finally had to turn-away some interested parties because the room had reached its limits.

ECP Journal: What is special about ECP, what makes it different?

Bengs: The Partnering format is something that started early in my professional life. But in the chemical industry, speed dating, or business partnering, was still unknown. Then again, the chemical industry is very diverse. So under which heading should we bring together the creative minds of so many sub-sectors? It was clear to me that the catalyst was innovation. Years of research and development are essential but we need to think outside the box to quickly create something new. It is precisely our curiosity that leads to discussions and cooperation to create more from what already exists. At the ECP, experts and decision-makers who had not realized what added value they can offer each other, meet.

ECP Journal: But don't people already meet at other events and exchange ideas?

Bengs: Yes, of course and every event format has its place. However, at traditional Trade Fairs, old acquaintances meet up and sell each other existing products. And at Congresses we usually contemplate the distant future. But a Partnering event for the chemical industry and all its user industries was missing.

The ECP effectively closes this gap. Innovation arises when we talk to people from other disciplines, when we step out of our comfort zone. Mankind is faced with huge challenges in areas such as water, nutrition, energy, mobility, housing, communication, climate change and health. Albert Einstein said once that problems can never be solved if we deploy the same way of thinking that created them. The ECP opens up new avenues for us.

ECP Journal: What role do Start-up companies play?

Bengs: A very, very important role. As do many large companies, small to medium-sized businesses, (the German Mittelstand) investors of all kinds and various expert and innovative service providers that play a very, very important role. It's about working together. I am happy to repeat it. But back to the Start-ups: they give us all more than just technology impulses.

They are agile, unconventional and also, with all due respect, sometimes chaotic. The resulting impulses are important because they encourage us to leave the beaten track. The entire chemical value chain, research, development, logistics, production, maintenance, quality management, everything will change dramatically. Start-ups of all kinds from Chemistry, Nanotechnology, Bio-economics, Digitization and other disciplines will be involved.

ECP Journal:In your opening speech you addressed the issue of innovations at the 3rd ECP. What was your motivation for doing this?

Bengs: All the changes we have made were very logical developments for the ECP in order to make it even more

successful for our participants: With umbrella topics such as "Energy and Chemistry", "Wood and Chemistry" or "Water and Chemistry", we and our partners are focusing on lateral thinking. In the Inversed Pitches, large companies can, for the first time at the ECP, explain what they mean by innovation and then focus on precisely tailored inquiries. In addition, all pitches which were recorded with the consent of the presenters are now available for viewing on the new ECP video platform, enabling ECP participants to catch up and deepen their understanding. The workshops give our sponsors more space to actively shape the ECP. The final panel was the starting point of a global think tank to advance issues related to industry, politics and society. Our intention is to continue to expand this first World Chemistry Forum.

ECP Journal: Participants report that the ECP has a very friendly, almost family-like atmosphere. Will it stay that way with more participants?

Bengs: Oh, definitely. I'm very confident about that. We have increased our numbers from 140 to over 800 participants in just two years. Companies are thirsty for sustainable innovations. How could I put a brake on this zest for action? We Homo Sapiens have always strived for progress and to make this world a better place. With that in mind, should it now become less familiar? I don't think so. At the beginning many people, previously unknown to each other, met for the first time. But ECP participants are very loyal because they realize how much they benefit from their participation. Everyone gets to know and appreciate each other better over time. I don't see any fundamental changes occurring in the DNA of the European Chemistry Partnering, on the contrary, the ECP community is growing and we all prefer to do business among friends.

ECP Journal: What does the future hold for the ECP?

Bengs: If I only knew! I'm a chemist and we chemists have learned to experiment. I know we have many of the right ingredients since we have been approached by numerous bodies and personalities about our networking and event competence. The UN's 17 Sustainable Development Goals are driving the chemical revolution forward. It's not just about classical chemistry as defined by the periodic table but, as I put it casually; it's also about important game changers like bio-economics, digitization and green chemistry. Of course, we all want to live sustainably on our planet and to leave behind a positive legacy to the next generation, not a disaster. 97 percent of all our products have been through at least one chemical process step, all these technologies and the changes they bring about account for my mantra-like repetition: Chemistry makes the World go around! And what I mean here is also the chemistry between us humans - for me this is the most positive fuel for innovative cooperation.

ECP Journal: ... Thank you for your time Dr. Bengs. It will be fascinating to observe where the ECP journey takes us. The next stop will be the Summer Summit in Düsseldorf and after that we return to Frankfurt in February 2020.

The questions were asked by author and journalist James Bryant

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