

The Future is 5G

5G has already been available at some locations in Germany since 2019. By 2025, ideally 90 percent of the country's territory should already be covered by the new mobile network. If the expansion of the mobile infrastructure and fiber-optic networks goes ahead as planned, the networked future promises innovations in all areas of life. In contrast to its predecessor 4G, the new generation is characterized by higher data rates of up to 10 gigabits per second and a very short latency of less than one millisecond, which means almost real time.

5G for different application areas

The biggest advantage of 5G is that it can be adapted to the requirements of a specific use case. The focus is currently on three areas of application: Services that rely on particularly high data rates, such as high-resolution video streaming in 4K or virtual and augmented reality, belong to the "Enhanced Mobile Broadband" group. The second group, "Massive Machine Type Communication", includes applications that require low data volumes but high energy efficiency and reliability. These include Industry 4.0 and the Internet of Things. In the future, several hundred thousand devices per base station could transmit information in real time. Applications that rely on the best connection quality, stability and availability belong to the third class - "ultra-reliable and low-latency communication". This includes, for example, real-time data transmission for autonomous driving. For vehicles to communicate successfully with each other and with the traf-



5G will drive forward connectivity in many areas of life.

fic infrastructure, it must be possible to transmit information and data ultra-fast and reliably in the future. This is where the short latency of the 5G network will come into play.

Adhesives help to drive innovation

Memory chips, mobile phone towers, fiber optic cables, servers – adhesives are used in almost all telecommunications equipment necessary for the implementation of the 5G network. They bond essential components with long-term durability, ensure reliable thermal management as heat builds up, and protect sensitive components from dust and moisture. In addition, adhesives enable innovative design options – for example, the miniaturization of high-performance memory chips. Adhesive technology is what makes the production of chips with ultra-thin interconnected layers possible in the first place. //

For further information, please visit: www.klebstoffe.com

Faster Development of Health Patches

In the medical industry, there is a steadily increasing demand for digital health solutions and technologies for remote patient monitoring. Accordingly, the market for smart health patches is also on a growth trajectory. To further boost the innovation process of smart patches, Henkel and the Belgian scale-up company Quad Industries are offering a demo package with twelve electrodes which can be ordered online. With these patches, engineers from the medical industry have the opportunity to

test their initial designs and can thus enter into a customized design earlier and in a more targeted way. The design phase is more efficient overall, as at least one design cycle is eliminated, reducing the associated time and costs.

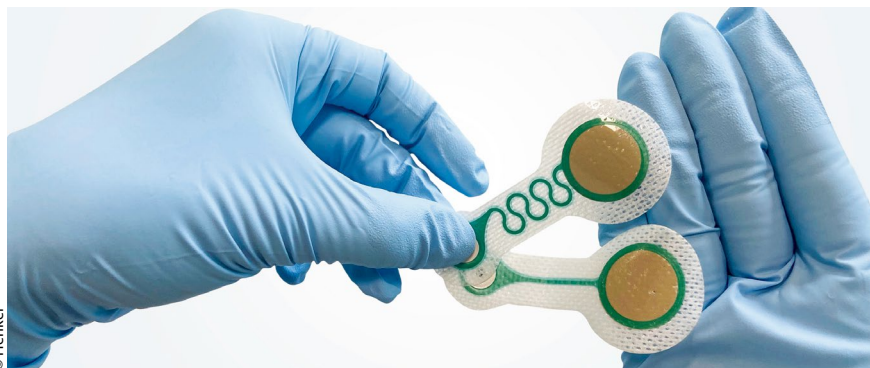
Measured values are still being extended

Initially, the focus of the demo package was on electrocardiographic monitoring

(ECG), as this is often used to map other clinical symptoms. An ECG is used not only to check the heart rate, but also various other values such as damage to heart muscle cells, the size of the heart or the function of implanted pacemakers. The goal is to expand the patches in the near future to include various measured values and to make them more multifunctional over time.

The electrodes contain five different materials from Henkel, including several new products. The demo patches contain a dry electrode adhesive that ensures electrical contact with the skin. The added value of the adhesive is that, unlike conventional hydrogel patches, the health patch can be worn for several days. //

For further information, please visit: www.henkel.com



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Renovating Parking Garages with Adhesives

A large number of parking garages have been built in recent decades with additive floor systems made of trapezoidal steel sheets and reinforced concrete. The major disadvantage of this inexpensive and fast construction method is that it is highly susceptible to exposure to weather and, above all, to de-icing salts. If the chlorides contained in the de-icing salts penetrate as far as the steel reinforcement or the sheet metal, corrosion of the reinforcing steel and sheet metal occurs after only a few years. Ceiling systems with such corrosion damage cannot be economically repaired using conventional technologies.

Success through a combination of two methods

The "GlueCS-Park" project combines two methods: cathodic corrosion protection on the concrete top surface of the parking decks and bonded reinforcement of damaged metal sheets. For the top side of the parking decks, researchers at Munich University of Applied Sciences are developing a cathodic corrosion protection system in which carbon nets are inserted into an additional thin layer of concrete. These serve as reinforcement for the ceiling and as an anode for the cathodic corrosion protection system to prevent corrosion with the help of a protective current distributed through the carbon net.

On the underside of the slab, permanent reinforcements made of steel are applied to the damaged trapezoidal sheets using a chloride-tight adhesive. Prof. Dr. Christian Schuler, a researcher at the Department of Civil Engineering at Munich University of Applied



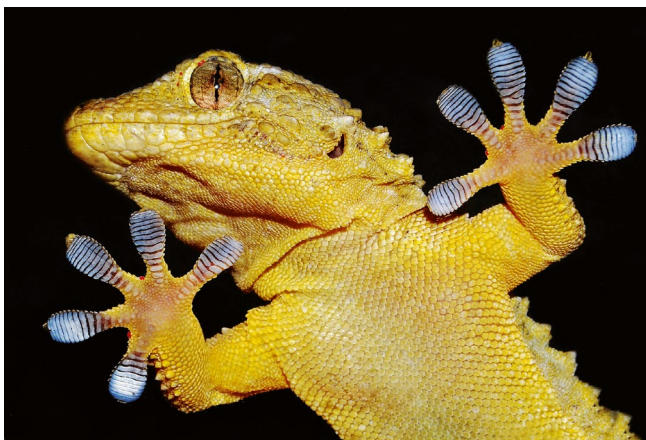
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Florian Ilg, a research associate at the Institute for Material and Building Research, applies adhesive reinforcement to a model of the underside of the ceiling of a parking garage.

Sciences, is responsible for the topic of restoration with adhesives: "We are not installing any new beams or supports, but want to use a kind of plaster to guide the force homogeneously around the damaged area." Initial long-term tests prove the efficiency of both methods: that the cathodic corrosion protection system stops further corrosion, and that the adhesive reinforcement continues to ensure the load-bearing capacity of the structure. // For further information, please visit: www.bau.hm.edu/en

What Gecko Feet and Robotic Gripping Systems Have in Common

No wall is too steep for geckos. They run upside down on ceilings and their fine-haired feet adhere better than any professional adhesive. This effect is to be used to develop energy-efficient adhesive pads for robots. The aim of a research project conducted by Fraun-



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In the BMBF research project "GeckI", the project consortium is researching and developing intelligent and energy-efficient adhesive systems following the example of nature.

hofer IZFP and other project partners is to further develop artificial intelligence methods in order to design a novel sensor system. This should enable the auto-adaptive, robot-assisted manipulation of objects with its own object recognition: The robotic arm is given the ability to sense what the product is and adapt accordingly. Especially in highly flexible and frequently changing production lines, but also in demanding environments such as in clean rooms and in vacuum, cost-effective, robot-assisted gripping systems are needed. Adhesive pads, which are attached to the robot arm, are to be equipped with intelligent sensors for this purpose and then used in production independently of the product. The range of applications is enormous and extends from sensitive objects or surfaces to heavy loads, fiberglass or car doors. The system is modelled on the feet of the gecko, which have the ability to hold considerable loads.

They use physical adhesion based on intermolecular van der Waals forces and can thus walk and climb without leaving any traces. A first important milestone has already been reached with the design of a test stand. With the help of a demonstrator, the researchers are making the robotic gripping contact and its structures visible. First sensor prototypes teach the bioinspired grippers to feel. //

For further information, please visit: www.izfp.fraunhofer.de/en

New Zealand's Sticky Night Sky in a Cave

The Glow Worm lures its prey into the trap with sparkling sticky silk threads. This is the larval form of the mosquito *Arachnocampa luminosa*, which is endemic to New Zealand and Australia. To catch their prey, the larvae build a kind of hammock on cave ceilings, to which silk threads up to 40cm long are attached side by side with sticky drops. The up to 40 threads resemble a curtain of beads but mean a deadly trap for other insects. This is because the larvae sit in self-spun hammocks and produce an intense blue bioluminescent light with a wavelength of 488nm with their luminescent organ at the rear end, imitating a starry sky.

This is how they attract moths, mayflies, sandflies and other insects that get caught in the sticky threads. The larvae can then pull their prey into their hammock like an angler and eat it. A team of researchers led by Janek von Byern of the University of Vienna and Victoria Dorrer of the Vienna University of Technology has found that the adhesive is composed of 99 % water and 1 % sticky components, which dry out when humidity drops and reabsorb water when it is above 80 %.



At first glance, the larvae of the Glow Worm look like a beautiful starry sky.

According to the researchers, the unusual property of the adhesive is thought to be due to urea or uric acid, which are natural excretory products of insects. It will certainly take years, but the long-term goal of the research is to use the knowledge

gained to develop and produce future adhesives for example for medical applications such as wound healing. //

For further information, please visit: www.klebstoffe.com

Expansion of Byk Production in Shanghai

Byk's new site in Shanghai is designed for an annual capacity of 4,750 tons. The whole Phase II project was officially com-

pleted on March 18, 2022. With the start of the second phase of the project, Byk is significantly expanding its production ca-

capacity in China in order to expand the production of additives for solventborne and solvent-free, low-polarity and high-polarity systems. These can be found in applications such as automotive, industrial, furniture, painting and architectural coatings, in printing inks and adhesives, and in thermoplastic and thermoset applications.

The expansion of Byk's additives production in Shanghai is the beginning of the company's development strategy in China. In the near future, the site will be further expanded and optimized in terms of energy. It will be a pioneer for smart production operation and green factory solutions and, as an integrated site, will have an intelligent manufacturing process with up to 85 % automatic feeding. The focus will be on the production of silicone additives with an annual capacity of more than 20,000 tons. //

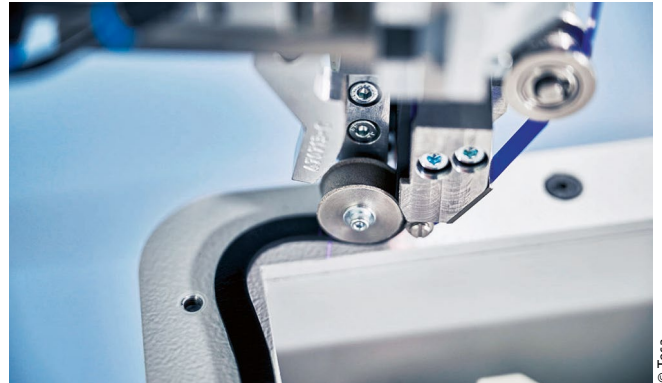


Location of Byk in Shanghai

For further information, please visit: www.byk.com

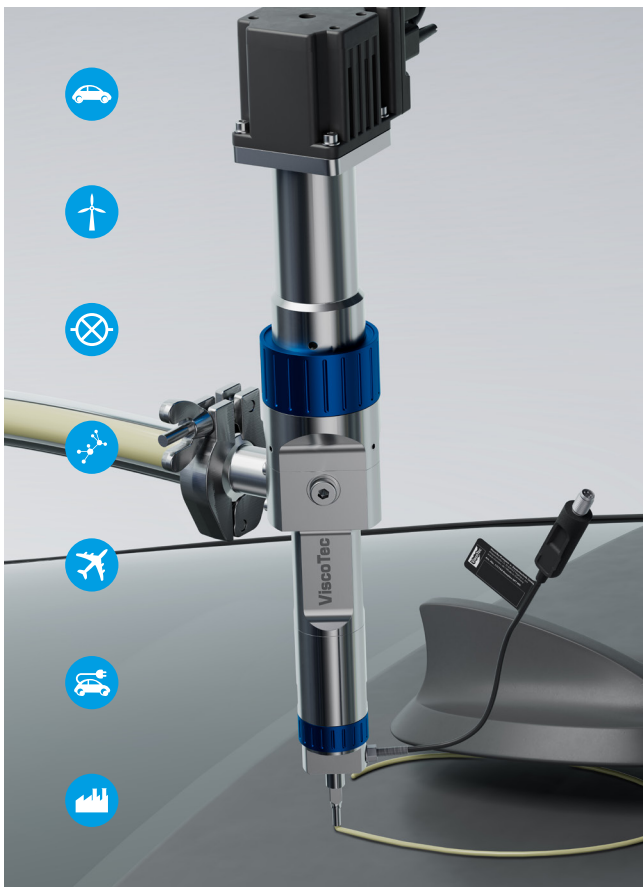
Cooperation in the Assembly of Battery Packs for E-Vehicles

Battery packs are at the heart of every vehicle that is electronically powered. Until now, the bonding and assembly of these battery systems required many individual partners. Tesa, Vulkan Technic and Liebherr are pooling their expertise and launching a fully automated assembly line for battery packs. Production is simplified by implementing an adhesive tape-based solution. The adhesive tape application can be fitted to battery packs with lids as well as to battery packs that are directly connected to the vehicle underbody. It requires no curing times and can be applied automatically without high demands on ambient temperature or humidity. Health and safety risks for users are thus minimized. This promises a safe and automatable sealing of the pack, but at the same time allows the lid to be disassembled for rework in the factory. This can streamline the production process because individual intermediate inspection processes can be replaced by subsequent end-of-line inspection by allowing the lid to be opened non-destructively. This also makes the process interesting for remanufacturing and the recycling process of battery systems. Liebherr and Vulkan Technic are providing technical support for customers in the design, programming, production and even



The concept provides a safe and automatable sealing of the battery pack, but at the same time allows the disassembly of the cover for rework in the factory.

commissioning of the assembly line. An initial demo version of the concept was already presented at the beginning of 2022. // For further information, please visit: www.tesa.com



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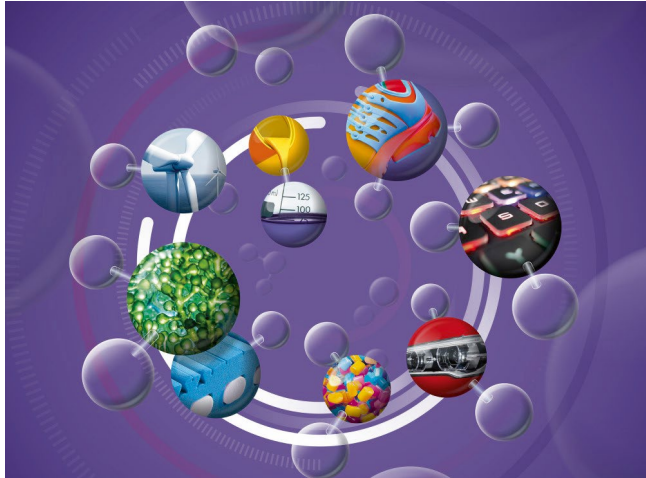
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Circular Solutions with Alternative Raw Materials



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Alternative raw materials are an important pillar in building a circular economy.

Under the new "CQ" label, Covestro offers products with a minimum content of 25 % alternative raw materials. CQ stands for "Circular Intelligence," an intelligent approach to more sustain-

able materials and solutions. Customers can distinguish products based on alternative raw materials from fossil-based products by the CQ label in the product name. Plastic waste is a valuable raw material and should not simply be disposed of. That is why Covestro wants to show that the path to a circular economy is possible for all stakeholders. The company is now introducing the name "Evocycle CQ" for the continuous evolution of recycling. It is an extension of the CQ label and stands for recycling technologies that enable the use of plastic recyclates and recycled raw materials from the portfolio within an optimized closed-loop system. Covestro is working with partners from all areas of recycling. The first initiative is called Evocycle CQ Mattress: Covestro has worked with partners to develop a technology for the chemolysis of flexible polyurethane foams from used mattresses, in which both main components, the polyol and the precursor to the isocyanate TDI, can be recovered. Since last year, the company has been operating a pilot plant at its Leverkusen site in Germany that confirms the laboratory test results. And the journey continues: Covestro is working with recycling specialists and other partners along the value chain to close the material loop for polyurethane mattresses completely and on an industrial scale. //

For further information, please visit: www.covestro.com

Bodo Möller Chemie Takes Over Spanish General Adhesivos

With a merger, the German Bodo Möller Chemie Group keeps expanding its business in Spain and Portugal, and enlarges

the expertise for the adhesive area in industrial applications. With the takeover of the Spanish distributor General Adhe-

sivos SLU in October of last year, the Bodo Möller Chemie Group also expands by an additional adhesive laboratory. In addition to the already existing Adhesive Competence Center (ACC) in Poland, which carries out chemical polymer tests as well as static and dynamic FEM calculations of bonded joints with reduction simulations, the laboratory in Spain offers especially mechanical plastic analyses and process simulations. General Adhesivos is located in close proximity to the industrial centers of Tarragona and Barcelona.

"This merger is an essential component for us to demonstrate our own expertise on the Iberian Peninsula. Moreover, we expand our overall know-how through the team and the laboratory of General Adhesivos, pursuing a pan-European approach and a general organic growth strategy in this way solely through the two laboratories in Poland and Spain," says Frank Haug, Chairman of the Board at the Bodo Möller Chemie Group. //



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On the picture, from left: Lionel Breuille (Managing Director Bodo Möller Chemie France), Alex Matosas (Managing Director Bodo Möller Chemie Spain), Korinna Möller (Managing Director Bodo Möller Chemie Group), Frank Haug (Chairman of the Board at the Bodo Möller Chemie Group), Beatriz Otero (CEO General Adhesivos) and Sergio Lopez (CEO General Adhesivos)

For further information, please visit: www.bm-chemie.com

German Adhesives Industry Records Growth in 2021

The German adhesives industry closed the fiscal year 2021 with a 13 % increase in sales in a persistently challenging market environment. For the current fiscal year, the German Adhesives Association (IVK) expects considerable challenges for the predominantly medium-sized German adhesives industry as a consequence of the Russian war of aggression in Ukraine and the effects of the associated energy crisis, despite continued sales growth.

Adhesives production 2021 in figures

Despite limited availability of raw materials, the German adhesives industry produced around one million tons of adhesives in 2021, exceeding the previous year's output by almost 5 %. Significant sales increases were achieved particularly in the adhesive tapes, sealants, and adhesives product groups. In Germany, 17,800 employees work for the adhesives industry; worldwide, the figure is around 51,600. Around 70 % of the member companies of the IVK are small and medium-sized businesses with fewer than 500 employees.

Important key markets in 2021

The metal and metal products (+ 7.8 %), machinery and equipment (+ 8.7 %) and electronic, electrical and optical equipment (+ 10.3 %) sectors were among the most important sales markets for adhesives in 2021. The chemicals (+ 5.5 %) and paper including printing segments also performed well (+ 4.1 %). In the construction segment, a decline in sales of 0.6 % was recorded in 2021 for the first time in many years. Despite the positive forecasts, material and supply shortages caused problems for the construction industry, particularly in the second half of 2021.

Prognosis for 2022

Following a strong first half, economic development is expected to weaken in the further course of the fiscal year, with a corresponding impact on production volumes. Many companies in the German adhesives industry assume that the sales growth

that is still anticipated will not compensate for the significant increase in costs for materials, energy and personnel. //

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The German adhesives industry closed the 2021 fiscal year with a 13 % increase in sales. A downturn is expected for 2022.

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