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KONFEKT – Ultra-thin glass on roll for flexible electronics

With support from the German Federal Ministry of Education and Research (BMBF), technology development partners Fraunhofer Institute for Organic Electronics, Electron Beam and Plasma Technology FEP, SCHOTT AG, VON ARDENNE GmbH and tesa SE have been developing new applications for ultra-thin glass on roll since 2013 in the research consortium KONFEKT (funding project 13N13818). The partners are planning to introduce the first results together at an international technology and networking event, VISION | Flexible Glass, April 4-5, at Fraunhofer FEP in Dresden, Germany.

Glass which is bendable and flexible enough that it can be transferred directly from the melt to the roller for wrapping is not something out of a science fiction film, but rather an actual product for the here and now. At the leading international exhibition for printed electronics, LOPEC, March 28-30 in Munich, each of the partners will have flexible thin glass on display at their respective exhibition booths (Hall B0: Fraunhofer FEP, booth 318; SCHOTT, booth 106; VON ARDENNE, booth 210). The international technology group SCHOTT is presenting several types of ultra-thin glass from its portfolio, which, due to their measure of flexibility, can not only be wrapped around a finger, but also onto rolls. The highlight at the company booth is a close-to-production prototype of ultra-thin glass on roll, which is currently being further developed and optimized through mid-2018 under the auspices of the research project KONFEKT in close cooperation with the Fraunhofer Institute for Organic Electronics, Electron Beam and Plasma Technology (Fraunhofer FEP), the specialty adhesive tape producer tesa SE and German equipment manufacturer VON ARDENNE GmbH.

Funded by the German Federal Ministry of Education and Research.

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of Education
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Ultra-thin glass as basis technology

With a minimal thickness of 25 micrometers (μm) SCHOTT's innovative ultra-thin glass is thinner than a single human hair. In ultra-thin thicknesses of less than 150 micrometers this glass has proven to be bendable yet stable. This leads to advantages over other substrate materials such as plastics, metals or silicon. In addition, as an inorganic material, glass offers a wide variety of benefits, whether it is in terms of optical quality, temperature stability, chemical consistency, gas density or mechanical resistance.

VISION | Flexible Glass

Following LOPEC, Fraunhofer FEP is organizing and hosting an international research and networking event, April 4-5 in Dresden, VISION | Flexible Glass, which focuses on

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driving forward the development of ultra-thin flexible glass. The institute has invited a number of experts to participate in the workshop and to discuss the future of this fascinating material.

An excited Dr. Manuela Junghähnel, group head for flatLab at Fraunhofer FEP, about the upcoming event: "With its reputation as a leading research and development center for the processing of flexible glass, Fraunhofer FEP is in a position to gather many of the global key players within the industry to attend VISION | Flexible Glass, including glass manufacturers, mechanical engineers and end users. With our workshop, we have committed ourselves to further developing and expanding the network with the aim of coming up with more innovative ideas for pioneering applications in this area."

At both the workshop in Dresden and at LOPEC 2017 the development partners are preparing to demonstrate how to successfully transfer the large-scale production of ultra-thin glass substrate into applications for organic and printed electronics.

Since the fall of 2013 the partners have been working together to drive forward the development of a "convertible thin-glass functional substrate for applications in organic electronics". The KONFEKT project is planned to run until mid-2018, but it has already produced significant results. Since the previous year, for example, the team was able to significantly enhance the glass edge strength. Despite the fact that there are still more challenges to manage and overcome in the next several months, the development partners are optimistic that through intensive research work and very close and productive collaboration, they will be able to bring glass on roll to market readiness together.

"Printed electronics is an interesting growth market where ultra-thin special glass can represent the optimal substrate for it," notes Thomas Wiegel, application engineer for ultra-thin glass at SCHOTT, adding, "which is why we are looking forward to giving visitors at LOPEC and VISION | Flexible Glass an exclusive preview of our research results thus far. We plan to have a close-to-production prototype of glass on roll with us, which tangibly demonstrates where we are at the moment and in which direction we are planning to go forward with it."

Target: Avoiding glass breakage

Because it is absolutely critical to avoid any breakage of the ultra-thin glass when rolling or processing it, the consortium partners are currently placing their focus on the optimization of this aspect of their combined research. Ultimately, the goal is to deliver a glass on roll which meets the highest possible quality standards.

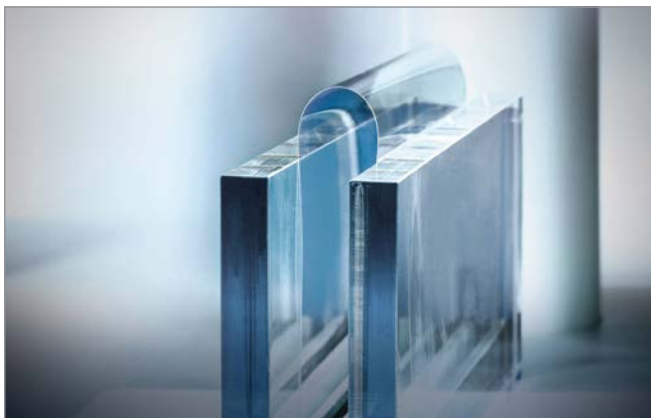
Each partner participating in the KONFEKT project brings its unique expertise to the research consortium with the aim of achieving a robust and unbreakable glass on roll by the end of the project, which maintains its functional surface area through coating and laminating processes. SCHOTT provides its expertise in ultra-thin glass along with its deep knowledge in the processing and chemical optimization of glass. Tesa SE, with a long history of providing adhesive tapes on rolls, gives the glass its finish by laminating it with special adhesive and functional layers.

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“As an innovative mechanical engineering company, VON ARDENNE brings decades of experience in the development and manufacture of roll-to-roll coating machinery for films and metal strips to this project, not to mention a wealth of know-how in magnetron sputtering for large-scale glass coating,” explains Dr. Andreas Nilsson, Vice President Web Coating for the Dresden-based company. “With our new web coating system, the FOSA LabX 330 Glass, we want to demonstrate today the feasibility of this forward-looking technology and we are truly thrilled about the exciting application development made possible based on flexible glass,” added Nilsson. VON ARDENNE will also be at LOPEC presenting its latest solution. The new system is scheduled to make its live debut to an audience of industry professionals when it is introduced at the VISION | Flexible Glass workshop.


Bending tests with flexible thin glass

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Flexible thin glass

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Project partners

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About SCHOTT

SCHOTT is a leading international technology group in the areas of specialty glass and glass-ceramics. The company has more than 130 years of outstanding development, materials and technology expertise and offers a broad portfolio of high-quality products and intelligent solutions. SCHOTT is an innovative enabler for many industries, including the home appliance, pharma, electronics, optics, life sciences, automotive and aviation industries. SCHOTT strives to play an important part of everyone's life and is committed to innovation and sustainable success. The group maintains a global presence with production sites and sales offices in 34 countries. With its workforce of approximately 15,000 employees, sales of 1.99 billion euros were generated in fiscal year 2015/2016. The parent company, SCHOTT AG, has its headquarters in Mainz (Germany) and is solely owned by the Carl Zeiss Foundation. As a foundation company, SCHOTT assumes special responsibility for its employees, society and the environment.

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About VON ARDENNE GmbH

VON ARDENNE develops and manufactures equipment for industrial coatings on materials such as glass, wafers, metal strip and polymer films. These coatings give the surfaces new functional properties and can be between one nanometer and a few micrometers thin, depending on the application. The coated materials are the basis for products such as architectural glass, solar modules or touch screens.

VON ARDENNE is a leading provider of architectural glass coating equipment and coating systems for thin-film photovoltaics. The family-owned company with subsidiaries in China, Japan, Malaysia and the USA relies on customer proximity in order to offer ideal on-site service. VON ARDENNE equipment is in operation in more than 50 countries around the world.

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About Fraunhofer FEP

The Fraunhofer Institute for Organic Electronics, Electron Beam and Plasma Technology FEP works on innovative solutions in the fields of vacuum coating, surface treatment as well as organic semiconductors. The core competences electron beam technology, sputtering and plasma-activated deposition, high-rate PECVD as well as technologies for the organic electronics and IC/system design provide a basis for these activities. Thus, Fraunhofer FEP offers a wide range of possibilities for research, development and pilot production, especially for the processing, sterilization, structuring and refining of surfaces as well as OLED microdisplays, organic and inorganic sensors, optical filters and flexible OLED lighting. Our aim is to seize the innovation potential of the electron beam, plasma technology and organic electronics for new production processes and devices and to make it available for our customers.

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About tesa SE

tesa SE is one of the world's leading manufacturers of technical adhesive tapes and self-adhesive system solutions (more than 7,000 products) for industrial and professional customers as well as end consumers. Since 2001, tesa SE (4,100 employees) has been a wholly owned affiliate of Beiersdorf AG (whose products include NIVEA, Eucerin, and La Prairie). Applications for various industrial sectors, such as the automotive industry, the electronics sector (e.g. smartphones, tablets), printing and paper, building supply, and security concepts for effective brand and product protection, account for about three-quarters of the tesa Group's sales (2015: 1,139.6 billion euros). tesa also recently began partnering with the pharmaceuticals industry to develop medicated patches. tesa earns just under one-quarter of its sales in the consumer segment, where 300 products make working at home and at the office easier.

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