

News Release

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Frost & Sullivan Recognizes Liquid Crystal Window Technology from Merck KGaA, Darmstadt, Germany

- **Merck KGaA, Darmstadt, Germany, receives Technology Innovation Award 2017 for its smart windows**
- **Frost & Sullivan analysis confirms superb customer benefit**

Darmstadt, Germany, October 25, 2017 – Merck KGaA, Darmstadt, Germany, a leading science and technology company, has received the Frost & Sullivan “Technology Innovation Award” in the category “Smart Glass Industry”. The award, which was presented at a ceremony in London on October 23, recognizes Merck KGaA, Darmstadt, Germany, as the Technology Innovation leader in the smart glass market. The demand for smart glass is growing worldwide – especially in the architecture and automotive sectors. Changing the incidence of light or creating privacy at the push of a button offers unique advantages such as a more comfortable environment, lower energy consumption for climate control, and preventing unwanted on-lookers.

“The award honors us for having developed a breakthrough technology with true competitive advantage. We are proud that our expertise in liquid crystal materials is making windows that switch within seconds possible,” said Michael Heckmeier, Head of the Display Materials business unit of Merck KGaA, Darmstadt, Germany. “Initial applications are resonating well with our customers in the architecture and automotive sectors. They are already waiting for production to start at our new site in Veldhoven, the Netherlands, at the end of 2017.”

“To succeed in the smart glass market, manufacturers need to present a product that primarily offers fast switching times and is both adaptable and durable over a longer period without losing its aesthetic appearance. According to our analysis,

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Merck KGaA, Darmstadt, Germany, has successfully leveraged its in-house technical expertise and research capabilities in liquid crystals to develop liquid crystal materials for windows that meet the aforementioned requirements," commented Afia Allapitchai, Research Analyst at Frost & Sullivan. "In our view, the company's liquid crystal window technology has the potential to be disruptive across a wide range of application sectors, enabling the company to establish its position as a market leader in the European smart glass market."

Each year, Frost & Sullivan presents this award to the company that has developed a product with innovative features and functionality, gaining rapid acceptance in the market. The award recognizes the quality of the solution and the customer value enhancements it enables. Frost & Sullivan uses a set of ten criteria to compare the performance of the competitors.

Visionary and sustainable: For architecture and vehicles

Three different variants of liquid crystal windows can be used in buildings: sun protection, glare protection, and privacy control. The sun protection variant will also be used for automotive applications. Thanks to the large selection of colors and shapes, the windows can be optimally adapted to the surroundings and they offer a high degree of design freedom. The sun protection variant can be realized in different light transmittance bandwidths and achieves energy savings of up to 40% in building climate control systems. For users, the windows offer maximum convenience since they offer continuously variable switching within seconds and are absolutely transparent and color-neutral in both, the bright and the dark state – two decisive advantages over competing technologies. With the glare protection variant, the glass not only darkens, it also becomes diffuse in order to prevent sun glare, for example on a computer monitor. Window shades or blinds are no longer needed. The privacy variant switches from transparent to translucent and prevents outsiders from seeing in. The special feature of the Merck KGaA, Darmstadt, Germany, technology is that the windows are crystal-clear in the transparent state. The materials, which are marketed under the licrivision brand, will also be used in vehicles. The first automotive manufacturers are planning to use the technology in the sunroofs of premium cars. In addition, Merck KGaA, Darmstadt, Germany, is evaluating use in airplanes, ships and sunglasses.

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Michael Heckmeier, Head of the Display Materials business unit of Merck KGaA, Darmstadt, Germany, on the left, receives the award for Merck. On the right: Jeff Frigstad, Global Senior Vice President Best Practices at Frost & Sullivan.

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About Merck KGaA, Darmstadt, Germany

Merck KGaA, Darmstadt, Germany, is a leading science and technology company in healthcare, life science and performance materials. Around 50,000 employees work to further develop technologies that improve and enhance life – from biopharmaceutical therapies to treat cancer or multiple sclerosis, cutting-edge systems for scientific research and production, to liquid crystals for smartphones and LCD televisions. In 2016, Merck KGaA, Darmstadt, Germany, generated sales of € 15.0 billion in 66 countries. Founded in 1668, Merck KGaA, Darmstadt, Germany, is the world's oldest pharmaceutical and chemical company. The founding family remains the majority owner of the publicly listed corporate group. Merck KGaA, Darmstadt, Germany, holds the global rights to the „Merck“ name and brand. The only exceptions are the United States and Canada, where the company operates as EMD Serono, MilliporeSigma and EMD Performance Materials.