Merck KGaA
Darmstadt, Germany

News Release

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Photovoltaic Windows: Energy Efficient and Energy Generating

- **Together with Polysolar and the Centre for Process Innovation (CPI), Merck KGaA, Darmstadt, Germany, is participating in a trendsetting research project**
- **Merck KGaA, Darmstadt, Germany, is optimizing its lisicon formulation for gray modules that are crucial to push the commercial use of organic photovoltaics**

Darmstadt, Germany, March 15, 2016 – Merck KGaA, Darmstadt, Germany, a leading science and technology company, announced today that it is collaborating with building-integrated photovoltaics (BIPV) producer Polysolar, and innovation center CPI for a project in the UK. The Innovate UK project called “Power Generating & Energy Saving Windows” aims to enable windows of the future to generate their own solar power as well as provide greater thermal control.

The project addresses the construction industry’s need for so-called zero carbon buildings by developing a transparent BIPV window that is capable of both generating power and controlling temperature. The commercialization of such a device will reduce building energy costs while offering architects greater freedom in structural design. Transparent solar glazing panels are easy to install in conventional framing, making them ideal also for surface applications such as windows, skylights, façades and roofing. The use of organic photovoltaics is attractive for a number of sectors because it is adaptable, lightweight, transparent and low-cost.

“We are excited to be part of this important project. This presents a unique opportunity to further develop the commercial use of gray OPV modules and to drive

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more widespread adoption of BIPV," said Brian Daniels, Head of the Advanced Technologies business unit at Merck KGaA, Darmstadt, Germany.

Intensive development underway

The project builds upon the partners' existing early-stage research to develop a commercially viable power-generating window at demonstration scale based on organic photovoltaic technology. An upgraded version of the recently launched semitransparent gray-colored lisicon formulation from Merck KGaA, Darmstadt, Germany, is a key element that will be further improved to help take this technology from a prototype to the market. The OPV window demonstrator will seek to achieve similar installation costs, transparency, performance and lifetime to that of high-performance glazing currently used in industry, while delivering energy yields comparable to those obtained by conventional photovoltaics in a vertical orientation.

"Modern architecture faces a dilemma of wishing to maximize natural light delivery and reduce building energy consumption," said Hamish Watson of Polysolar. "With our OPV glazing, we deal with these conflicts while also generating carbon-free renewable energy, thus enabling buildings of the future to be truly zero carbon."

"The output of the project will be to produce large-scale organic photovoltaic devices using sustainable, low-cost manufacturing processes. Once concluded, the project will provide the industry with the required lifetimes, dimensions and price points needed to evaluate how to take this emerging technology to market," Dave Barwick, Principal Scientist at CPI added.

About Polysolar:
Polysolar is an award-winning UK-based producer of building-integrated photovoltaic glazing. The company develops and produces a unique range of transparent and opaque thin-film photovoltaic glazing panels. Polysolar is also a world leader in delivering innovative BIPV solutions, including everything from solar curtain walling systems, to greenhouses and shelters.

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About the Centre for Process Innovation (CPI):
The Centre for Process Innovation is a UK-based technology innovation center and part of the High Value Manufacturing Catapult. They use applied knowledge in science and engineering combined with state-of-the-art development facilities to enable their clients to develop, prove, prototype and scale up the next generation of products and processes. The open innovation model enables clients to develop products and prove processes with minimal risk. New products and processes can be shown to be feasible before being manufactured at an industrial scale.

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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 2015, Merck KGaA, Darmstadt, Germany, generated sales of € 12.85 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 KGaA, Darmstadt, Germany, name and brand. The only exceptions are the United States and Canada, where the company operates as EMD Serono, MilliporeSigma and EMD Performance Materials.