

News Release

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EU Horizon 2020 Project “HyperOLED” Successfully Launched

- **Consortium of five partners from science and industry creates the basis for the future development of high-performance, hyperfluorescence OLEDs**
- **Expected improvements in OLED include cost saving and reduced environmental impact**

Darmstadt, Germany, April 12, 2017 – Merck KGaA, Darmstadt, Germany, a leading science and technology company, today announced the successful launch of the HyperOLED project, a € 4 million project funded by the European Union’s Horizon 2020 research and innovation program. Over a three-year period, the HyperOLED project will develop materials and device architectures for high-performance, hyperfluorescent organic light-emitting diodes (OLEDs) for use in display applications and solid state lighting. Within the scope of this project, Merck KGaA, Darmstadt, Germany, as the project coordinator, will be in close collaboration with an excellent consortium of four European partners: Microoled (France), Fraunhofer IOF (Germany), Durham University (UK) and Intelligentsia Consultants (Luxembourg).

The main objective of the HyperOLED project is to develop innovative high-performance OLEDs by combining thermally activated delayed fluorescence (TADF) molecular hosts with novel, specifically adapted shielded fluorescence emitters. The HyperOLED project will directly contribute to the development of thin, organic and large area Electronics (TOLAE), which is an emerging technology with high growth potential. The project will help to create reliable TOLAE-enabled devices with increased functionality, improved performance and longer lifetimes.

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The new OLEDs promise to be more cost-efficient to manufacture because they are based on white OLED stacks that are easier to produce compared to current solutions. By reducing the number of layers in the OLED stacks, around 20-40% of organic materials can be saved, tact times can be reduced and less manufacturing equipment will be required. This will lead to considerable savings throughout the whole value chain, including solvents, educts, catalysts in material synthesis, energy saving in purification by sublimation as well as energy saving in OLED production.

Furthermore, thanks to the special properties of TADF molecular hosts and novel shielded fluorescence emitters, the improvement in OLED performance is expected to eliminate the need for expensive and rare metals (e.g. iridium and platinum), creating additional environmental and cost-saving impacts.

With the broad expertise of the consortium spanning the development and production of hyperfluorescence OLEDs, the HyperOLED project will directly target high-growth potential applications. Overall, this project is expected to stimulate exciting new business opportunities and economic output for Europe and beyond.

The HyperOLED project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement number 732013.

About the Consortium

About Microoled

As a renowned centre of excellence for chipset and nanotechnology development since 2007, Microoled designs, develops, and manufactures high-performance microdisplays for near-to-eye applications. The company's core consists of highly integrated microdisplays for use in head-mounted displays, electronic viewfinders for cameras, sport optics, night vision and thermal systems, medical, and other applications. Microoled is uniquely positioned for these markets by providing microdisplays with the worldwide highest pixel density, lowest consumption, and a widely recognised outstanding image quality. Since the start of production in 2012 on a dedicated microdisplay manufacturing line (5 M€ initial invest), microdisplay sales are at an average growth rate of over 40% over the past years, reaching about 6M€ in 2015, with an outlook for continuing growth in 2017. Microoled received the Ernst & Young Award "Entrepreneur of the year" for the region Rhone-Alpes/ Auvergne, France in 2014. (www.microoled.net)

About Fraunhofer-IOF

The Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. is Europe's largest application-oriented research organization. Research and development at Fraunhofer Institute for Applied Optics and Precision Engineering (Fraunhofer-IOF) focuses on optical systems technology in order to continually improve the control of light from generation via guiding and manipulation up to its application. Main research areas cover the field of optical thin-films, optical metrology, micro-optical technologies and systems, as well as precision engineering with focus on the development of precision optical systems. In particular, work for HyperOLED will be performed by the Micro-Optical-Systems Department, having

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over 20 years' experience in micro- and nano-optics design and prototyping. Their worldwide recognition in this field is mainly due to the symbiosis of optical design, element fabrication, and system integration, where simulation issues are tackled by means of different commercially available software, self-written tools or add-ons. Fabrication technologies including electron-beam- and laser-lithography, reactive ion etching, UV-replication, may be applied for master structure preparation as well as replication of micro-optical elements. Previous work includes the application of this expertise to organic LED optical modelling. (www.iof.fraunhofer.de)

About Durham University

Durham University is a world Top 100 University, ranked 4th in the UK, and a member of the leading Russell group of Universities, where their Department of Physics is also one of the UK's leading physics and astronomy departments. Within the department is one of the world's leading groups for spectroscopic studies of OLED and OLED materials who have worked closely with many of the leading European/World OLED companies, especially in studies of triplet exciton properties in materials and devices. Another reputable research group is rooted in new synthetic chemistry, exploring fields such as: Synthesis of organic molecules and polymers and Molecular (single-molecule) and nanoscale electronics for advanced technology applications. Established at the university in 1987, the Centre for Molecular and Nanoscale Electronics focuses on electronic devices enabled by molecular or nanoscale materials, bringing together advanced metrology and processing, materials synthesis and characterisation, spectroscopy and modelling to better understand a wide range of devices including transistors, solar cells, light-emitting diodes, memory and artificial neural networks. (www.dur.ac.uk)

About Intelligentsia Consultants

Intelligentsia Consultants provide high-quality, knowledge-based consultancy services to support research and innovation in private and public organisations. Their range of consultancy services covers the following areas: Grant Proposal Writing, R&D Tax Relief, European Programmes, National Funding, Training, Project Management, Technology Transfer and Other Services, such as Web Development. (www.intelligentsia-consultants.com)

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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.