

## “PeroBOOST” project researches development of solar cells from perovskites

Consortium to develop basis for innovative and efficient solar cells

Köln/Germany, June 21, 2016 – The University of Cologne will be pressing ahead with research on perovskite solar cells within the “PeroBOOST” project together with AIXTRON SE, Enerthing GmbH, Lunovu GmbH, SOLUXX GmbH, the Center for Organic Electronics Cologne (ZOEK) gGmbH, the Fraunhofer ISE Laboratory and Service Center Gelsenkirchen, and Duisburg-Essen University.

The basis for this three-year project (03/2016-02/2019) is the recent discovery of the superb properties of organo-perovskite materials for efficient solar cells. This long known class of materials offers surprisingly great potential in terms of its energy conversion efficiency. The latest research results already report efficiency levels of more than 20%. The new type of solar cells is thus expected to achieve a similarly high level of energy efficiency as solar cells made of silicon. In addition to being expected to involve lower costs, this technology also opens up a variety of novel future applications due to its manufacturability on flexible substrates. Another attractive option involves using the technology in combination with silicon photovoltaics to further enhance efficiency.

The perovskite solar cell based on thin film technology has many features in common with innovative organic photovoltaics in terms of the materials used. The disadvantage of perovskite solar cells to date, however, has been that the highest efficiency rates have only been achieved with lead-based materials. The development of perovskite solar cells that are stable on a long-term basis is also only in its infancy. Lead-free systems currently show lower levels of efficiency and long-term stability. The “PeroBOOST” project will therefore be focusing above all on two aspects and aiming to develop these further:

- Efficient and stable lead-free perovskite solar cells
- Scaling up methods and techniques.

To this end, the project will investigate and develop two industrial production processes, namely vacuum coating and wet-chemical roll-to-roll coating.

The aim of the project is to investigate the stability of the solar cells and to develop processes and materials to enhance stability. For initial applications, we aim to achieve a lifetime of 3-5 years.

“PeroBOOST” is being supported with funds from the European Regional Development Fund (ERDF) 2014-2020.

#### About University of Cologne

As part of the "Excellence Initiative", the University of Cologne is supporting the field of "Quantum Matters and Materials (QM<sup>2</sup>)". This also involves performing basic research on the properties of application-oriented, nanostructured materials. The working group led by Professor Meerholz – also part of QM<sup>2</sup> – is developing and characterizing new materials and processes for use in the production of efficient (opto-)electronic components with organic semiconductors. A team of around 30 scientists and doctoral students from the fields of physical chemistry, organic chemistry, solid-state physics, and electronics is accompanying this innovation process on an interdisciplinary basis and thus pursuing basic research without losing sight of potential applications. The Meerholz working group is one of the world's leading groups in the field of organic electronics such as organic solar cells or organic LEDs.

#### About AIXTRON SE

AIXTRON SE is a leading provider of deposition equipment to the semiconductor industry. The Company was founded in 1983 and is headquartered in Herzogenrath (near Aachen), Germany, with subsidiaries and sales offices in Asia, Europe and in the United States. AIXTRON's technology solutions are used by a diverse range of customers worldwide to build advanced components for electronic and opto-electronic applications based on compound, silicon, or organic semiconductor materials. Such components are used in a broad range of innovative applications, technologies and industries. These include LED applications, display technologies, data storage, data transmission, energy management and conversion, communication, signaling and lighting as well as a range of other leading-edge technologies.

#### About Enerthing GmbH

Ever larger numbers of things in our surrounding environment require a supply of electricity. Smartly connecting these things – in the Internet of Things – is expected to lead to further substantial growth. Due to a lack of alternatives, service-intensive batteries and/or complicated cabling are the prevalent solutions.

Enerthing GmbH develops system solutions for the self-sufficient solar operation of existing and new products. The primary objectives are to reduce operating and installation costs and to improve sustainability. Our development of third-generation flexible thin-film photovoltaics modules enables us to combine properties such as excellent low-light performance, low weight, and great mechanical flexibility, thus creating the basis needed for the integration and functionality of new products.

#### About Lunovu GmbH

LUNOVU is an innovative laser technology company based in Herzogenrath. The company builds laser machine systems for processing materials, and especially for generative manufacturing and for micro-processing/thin film technology. Its key focus is on integrated systems that include the latest beam sources, optics, select electro-mechanical components and innovative control and automation technology. LUNOVU technology is successfully used in the fields of automotive, aerospace, energy generation, biotechnology, and medical technology. Further information can be found at [www.lunovu.com](http://www.lunovu.com).

#### About SOLUXX GmbH

Founded in Cologne in 2008, Soluxx GmbH is a research and development company focusing on organic electronics. The company's team has all-round competence and longstanding experience in the fields of materials, coating, measuring technology, and component fabrication.

Soluxx has produced electrospray coating systems for several years now. The company offers both small-scale systems with single sprayers (singleESD) for use in basic research and flexibly scalable systems with multiple sprayers (multiESD) for large-scale industrial coating assignments. The benefit of electrospray coating lies in the production of ultrathin, homogenous layers in which the properties of the layer can easily be influenced.

Soluxx is also involved in building precision-mechanical special constructions, such as measuring apparatus, specimen holders, and demonstrators. These activities were supplemented in 2015 by a new business field involving the construction of OLED luminaires. Here, the company produces both large-scale installations with more than 100 individual OLED panels as well as individual lights for consumer applications.

#### About Center for Organic Electronics Cologne (ZOEK) gGmbH

The "Center for Organic Electronics Cologne – ZOEK" is a non-profit limited liability company that has set itself the task of building a bridge between application-oriented research at universities and upstream development work at companies and thus of facilitating the "genuine" transfer of research findings. New insights and processes evolving in university environments are developed further to the point at which they can be taken over by industry. The Center's longstanding experience in organic electronics has already made it a specialist in this field. Its core competences are in characterizing electronic-functional materials, implementing organic electronics R&D assignments, and analyzing degradation processes in organic electronic components. The ZOEK is the anchor tenant at the COPT.CENTRE for Organic Electronics at the University of Cologne. When performing tasks in this project, the ZOEK will be drawing on the infrastructure available at the COPT.CENTRE.

#### About Fraunhofer ISE Laboratory and Service Center (LSC) Gelsenkirchen

The Laboratory and Service Center Gelsenkirchen has specialized since 1999 on the development of industrial relevant processes for the production of solar cells.

LSC Gelsenkirchen has two fully equipped technology areas for the manufacture of crystalline silicon, silicon hetero, and thin film solar cells. It has extensive measurement technology for the characterization of films and solar cells. LSC develops and supplies measurement technology for cell and material characterization.

Within the PeroBOOST project, LSC Gelsenkirchen will be responsible for developing new transparent conductors based on silver and copper nanowires.

#### About Duisburg-Essen University (UDE)

With around 42,000 students, Duisburg-Essen University is the third-largest university in the state of North Rhine-Westphalia. Among the wide range of subjects on offer, materials development and nanomaterials are important topics across various faculties. The Materials Chain is also a firmly established research focus within the Ruhr University Alliance. PeroBOOST is being supported by two institutes at UDE, the Institute of Materials Science and the Institute of Nanostructure Technology. The Institute for Materials Science develops and investigates functional materials for use in construction and electrical technology. Perovskites have been the most important research field for more than 20 years now, although the types suited for use as solar cell materials have only been looked into more recently. The focus here is on materials synthesis. The Institute for Nanostructure Technology develop tools and prototypes for use in electrical technology. Major topics here are thermoelectric materials and solar cells. Existing research on organic solar cells is now being supplemented to include organic-inorganic systems. The Institute's strengths also include device technology and opto-electronic and electrical characterization.