

PRESS RELEASE

Imec and Solliance's perovskite PV modules achieve 12.4%

Leuven (Belgium), Eindhoven (Netherlands), April 11, 2017 – Imec, the world-leading research and innovation hub in nanoelectronics, energy and digital technologies, and partner in Solliance today announced that they have improved their 4x4cm² perovskite module achieving a certified conversion efficiency of 12.4%, which is amongst the highest for this size of perovskite modules. The module efficiency was measured under long-term maximum power point (MPP) tracking, testifying to its exceptional stability. At Solliance, this perovskite technology is developed with industrially-applicable processes and with a view towards a rapid market introduction of this promising source of renewable energy.

Perovskite microcrystals are a promising material to make high-yielding thin-film solar cells. They can be processed into thin, light-weight, semitransparent modules that could eventually be integrated in building materials such as windows or curved construction elements. Imec and Solliance focus on using scalable, industrial processes towards the fabrication of large-area modules, eventually suitable for seamless integration in customized PV systems.

The state-of-the-art perovskite modules were made at imec using an advanced recipe for the active layer and a process that achieves a very high aperture area efficiency in combination with a high operational device stability. In the current design, eight cells are connected in series by using a low area loss interconnection technology based on laser and mechanical patterning. Due to this optimization, about 90% of the designated illumination area of 16cm² is contributing to the energy generation. The remarkable device stability and performance is represented by the 12.4% power conversion efficiency under more than ten minutes maximum power point tracking as certified by Fraunhofer ISE.

“This breakthrough achievement confirms that we are able to steadily improve the conversion efficiency of perovskite solar modules,” commented Tom Aernouts, Solliance program manager and group leader for thin-film photovoltaics at imec. “In a few years’ time, we have made rapid progress not only on conversion efficiencies for single cells but are now also consolidating this at module level for this type of thin-film photovoltaics. Looking ahead, within Solliance we’ve set an aggressive roadmap for larger-area low cost processing and long-term stability that will advance this technology beyond the lab.”

Imec develops its industrial R&D platform for perovskite modules in the framework of Solliance, a cross-border Dutch-German-Flemish thin-film photovoltaics research initiative, conducting advanced research on the development of perovskite-based PV modules and its applications, with industrial

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partners Solartek, Dyesol and Panasonic. With these results, the Solliance partners demonstrate the effectiveness of their collaboration in the development of perovskite based PV modules.

Denis Kovalevich, The Chair of the Board of Directors of Solartek remarked: "Solartek is excited with this breakthrough; we are going to continue our fruitful collaboration with Solliance, supplying imec and other research teams with samples of high tech materials, such a CNT inks, to reduce the cost of production of perovskite modules on large scale processing by replacing most expensive materials, like gold."

Imec will showcase its silicon and perovskite photovoltaic technologies at SNEC, the biggest PV trade show worldwide, April 19-21, 2017 (Shanghai New Int'l Expo Center, Shanghai, China) Booth E2.573

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About imec

Imec is the world-leading research and innovation hub in nano-electronics, energy and digital technologies. The combination of our widely acclaimed leadership in microchip technology and profound software and ICT expertise is what makes us unique. By leveraging our world-class infrastructure and local and global ecosystem of partners across a multitude of industries, we create groundbreaking innovation in application domains such as healthcare, smart cities and mobility, logistics and manufacturing, and energy.

As a trusted partner for companies, start-ups and universities we bring together close to 3,500 brilliant minds from over 70 nationalities. Imec is headquartered in Leuven, Belgium and also has distributed R&D groups at a number of Flemish universities, in the Netherlands, Taiwan, USA, China, and offices in India and Japan. In 2015, imec's revenue (P&L) totaled 415 million euro and of iMinds which is integrated in imec as of September 21, 2016 52 million euro. Further information on imec can be found at www.imec.be

Imec is a registered trademark for the activities of IMEC International (a legal entity set up under Belgian law as a "stichting van openbaar nut"), imec Belgium (IMEC vzw supported by the Flemish Government), imec the Netherlands (Stichting IMEC Nederland, part of Holst Centre which is supported by the Dutch Government), imec Taiwan (IMEC Taiwan Co.) and imec China (IMEC Microelectronics (Shanghai) Co. Ltd.) and imec India (Imec India Private Limited), imec Florida (IMEC USA nanoelectronics design center).

Imec is also a partner in EnergyVille (www.energyville.be), an association of the Flemish research centers KU Leuven, VITO, imec and UHasselt in the field of sustainable energy and intelligent energy systems.

About Solliance

Solliance is a partnership of R&D organizations from the Netherlands, Belgium and Germany working in thin film photovoltaic solar energy (TFPV). In order to strengthen the region's position as a world player in PV, Solliance is creating the required synergy by consolidating and coordinating the activities of 250 researchers in industry, at research institutes and universities.

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Various state-of-the-art laboratories and pilot production lines are jointly used for dedicated research programs which are executed in close cooperation with the solar business community.

Solliance partners are: ECN, imec, TNO, Holst Centre, TU/e, Forschungszentrum Jülich, University Hasselt and Delft University of Technology.

Solliance offers participation in its research programs and opens up its lab facilities to new entrants, either from industry or in research. On the basis of clear Intellectual Property (IP) agreements, each industrial partner can participate in this research effort, or alternatively, hire equipment and experts to further develop its own technology.

About Dyesol

Dyesol is a global leader in the development and commercialisation of Perovskite Solar Cell (PSC) technology – 3rd Generation photovoltaic technology that can be applied to glass, metal, polymers or cement. Dyesol manufactures and supplies high performance materials and is focussed on the successful commercialisation of PSC photovoltaics. It is a publicly listed company: Australian Securities Exchange ASX (DYE) and German Open Market (D5I).

About Solartek

Solartek Ltd. is a company registered in Russian Federation and located at Troitsk, Moscow. Solartek is an industrial partner of the Solliance. Six venture-building Nanotechnology Centers are investing Solartek as the joint company which playing the role of the business incubator and IP-box in photovoltaics. Solartek is creating different types of business - from small scale PV-FABs to BIPV-product companies. In the framework of Solliance perovskite-PV and CIGS-PV research activities Solartek is developing and supplying the samples of advanced PV materials (CNT-based conductive films) for conducting tests, aimed on cutting the production costs of PV products.

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