PRESS RELEASE

Imec and its Partners Achieve Record Efficiency for Large Area Industrial Crystalline-silicon n-PERT Solar Cell

Increased Solar Cell Performance Supports Adoption of Solar Cell Technology Based on N-Type Substrates

SEMICON WEST/INTERSOLAR NORTH AMERICA (Booth #SH2311), San Francisco— July 7, 2014 — Nano-electronics research center imec, reported today a n-type PERT crystalline silicon (Si) solar cell fabricated on a large area wafer (15.6cm x 15.6 cm) reaching a top conversion efficiency of 21.5 percent (calibrated at ISE Callab). This is the highest efficiency achieved for this type of solar cell on an industrial large area wafer size. This result will accelerate the adoption of n-type PERT (Passivated Emitter, Rear Totally diffused) solar cells in the industry as it clearly shows the potential for improved conversion efficiencies for next generation standard two side contacted crystalline silicon solar cells. Additionally imec researchers showed recently that n-type PERT solar cells of imec, having a rear emitter, are not affected by reliability risks originating from a front Ni/Cu plated metallization.

The cell reaching this 21.5 percent conversion efficiency had an open circuit voltage (V_{oc}) of 677mV, a short circuit current (J_{sc}) of 39.1 mA/cm^2, and 81.3% fill factor, and features a rear blanket p^+ emitter obtained by boron diffusion. Reliable front metal contacts on an n^+ front-surface-field are formed by means of Ni/Cu/Ag plating (3 bus bars grid) using an industrial plating tool from Meco, while the rear local contacts to the p^+ emitter were obtained by laser ablation of the rear passivation stack and subsequent physical-vapor-deposition of aluminum. The rear passivation stack includes a thin (<10 nm) Atomic-Layer-Deposited (ALD) Al_2O_3 layer, deposited with the spatial ALD technique InPassion Lab® from SoLayTec. The adoption of ALD Al_2O_3 based-passivation for the p^+ emitter resulted in an average improvement in cell efficiency of about 0.3% absolute with respect to passivation by wet thermal oxidation.

"Notwithstanding the early development stage, the result shows very high efficiency potential of n-type PERT solar cells," said Jozef Szlufcik, director of imec's PV department, "Moreover, n-type cells remain unaffected by light induced degradation present in p-type cells due to Boron-Oxygen complex, which results in improved long term energy yield and, therefore, lower total cost/kWh".

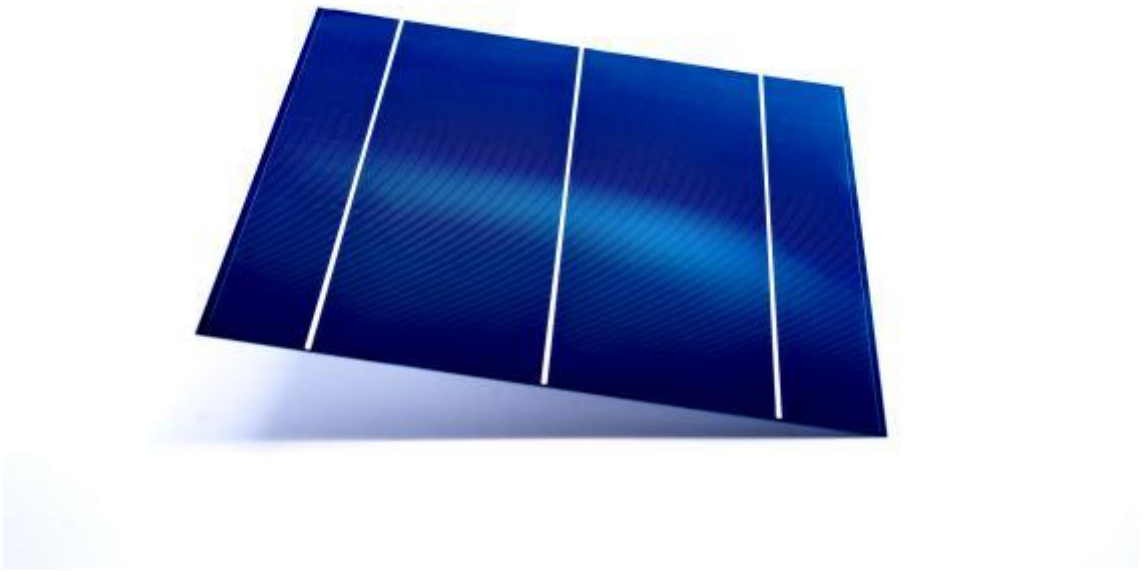
PRESS RELEASE

These results have been achieved in the framework of the imec's industrial affiliation program on advanced silicon solar cells, dedicated to developing high performance and low cost Si PV-technologies. In this program, imec works closely together with industrial and academic partners along the solar cell value chain. Via participation and contribution to this program, these partners support imec's developments and obtain early access to new technology solutions in this way accelerating their own product development.

To learn more about imec's solar cell research progress, please visit the imec at booth #SH2311 at Semicon West/Intersolar North America, taking place July 8-10, 2014 in San Francisco.

---end---

This press release can be downloaded at http://www2.imec.be/be_en/press/imec-news/imec-nPERT-solar-cell.html



About imec

Imec performs world-leading research in nanoelectronics. Imec leverages its scientific knowledge with the innovative power of its global partnerships in ICT, healthcare and energy. Imec delivers industry-relevant technology solutions. In a unique high-tech environment, its international top talent is committed to providing the building blocks for a better life in a sustainable society. Imec is headquartered in Leuven, Belgium, and has offices in Belgium, the Netherlands, Taiwan, US, China, India and Japan. Its staff of over 2,080 people includes more than 670 industrial residents and guest researchers. In 2013, imec's revenue (P&L) totaled 332

million euro. Further information on imec can be found at www.imec.be. Stay up to date about what's happening at imec with the monthly imec magazine, available for tablets and smartphones (as an app for iOS and Android), or via the website www.imec.be/imecmagazine

Contact:

imec : Hanne Degans, External Communications Officer, T: +32 16 28 17 69, Mobile : +32 486 06 51 75, hanne.degans@imec.be