

Innovative metallization process for reliable, high-efficiency solar cells

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Imec today announced that it has developed an innovative process for plated front contact formation of silicon solar cells using only one sequence to plate several metals. The large-area solar cells were processed in imec's labs and combine an excellent reliability with a conversion efficiency of 20.3% (certified at Fraunhofer ISE-Callab). The full plating sequence has been transferred to an in-line plating tool enabling high throughput.

The new process for plated contact formation uses one plating sequence (plating Ni, Cu, and Ag), followed by a thermal anneal. This single sequence plating process results in a better aspect ratio and minimal silver usage compared to the standard screen-printed metallization with silver paste. The improved aspect ratio reduces the shadow loss and thus increases the [conversion efficiency](#), while the metallization with mainly copper provides a more sustainable alternative to the currently used silver metallization.

The resulting [adherence](#) of the plated contacts is excellent as solder tab adhesion pull tests show a pull strength beyond 2N. Produced with this process, single-cell laminates and mini-modules have successfully passed one and a half times the thermal cycling and damp heat cycles defined by IEC 61215, the industry's standard which qualifies [silicon solar cells](#) and modules for long-term operation.

Dr. Jef Poortmans, director Photovoltaics research at imec: "This new metallization process is the latest optimization to imec's PERC process,

optimizing the cost-of-ownership and conversion [efficiency](#) of cells through structure and material optimizations. The process and resulting large-area Cz p-type [silicon cells](#) are fully compatible with the requirements of industrial photovoltaic production. With a certified efficiency of 20.3% and a recent batch of cells with even higher efficiencies, next steps in our R&D should boost efficiencies of PERC solar cells to well over 21%."

The results were achieved within imec's silicon solar cell industrial affiliation program (IIAP), a multi-partner R&D program that explores and develops advanced process technologies aiming a sharp reduction in silicon use, whilst increasing cell efficiency and hence further lowering substantially the cost per Watt peak. Industrial partners that wish to integrate innovative processes into their solar cell production are welcome to join imec's R&D program.

Provided by IMEC

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