
Release: No. 599, June 23, 2016

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Innovative new illumination design and new fast inspection software algorithms for high performance on complicated cell designs

Ready for future cell designs – A new and reliable standard for the inspection of even the most demanding solar cell concepts

While PERC (passivated emitter and rear cell) design is currently the most promising cell design and will account for the majority of solar cells in the near future, IBC design is the option with the highest efficiency suitable for mass production. With the contacts soldered only to the rear of the cell, IBC minimizes shadowing and achieves efficiencies of over 23 percent. But quality assurance for IBC cells is not easy, as they typically display much higher metallization on the contact side. This means that the rear of the wafer is more reflective, making it hard to achieve images for reliable inspection performance. Special IBC processes require greater flexibility to capture the relevant structures and clearly separate the features to inspect.

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IBC cells are chemically etched flat on the rear of a solar cell. Together, the different contacts create a smooth rear surface, as the wafer is covered with layers of metal, resistors and soldering areas. Differentiating between different materials and overcoming incorrect detection caused by direct reflection is a major challenge for inspection tools.

KFP technology solves the IBC inspection challenge

ISRA VISION/GP SOLAR has the solution: their new KFP Light Dome. With a new approach to lighting, it is able to separate all the necessary details. The KFP Light Dome enables different lighting set-ups, allowing high contrast for even the smallest details. By using different types of lighting in their multi-view approach, ISRA and GP SOLAR have succeeded in developing a reliable way to inspect difficult technologies like PERC cells, and the finished products of plating or multiple coating processes. But unlike these inspection tasks, IBC inspection can no longer be achieved through high resolution for defining finger widths alone. IBC cells have wide fingers, but defective positioning and tiny pinholes during the process can lead to severely impaired cell efficiency. High-precision inspection for positioning, bridging and missing areas is needed.

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Multi-View technology successfully extended

Having enabled excellent rear contact inspection by creating sharply contoured images even on colored surfaces, ISRA VISION/GP SOLAR's multi-view technology has now reached the next level for IBC inspection. By changing the angle of the incident light to add different types of lighting, ISRA has now achieved unbeatable results in IBC inspection. The robust software enables cycle times of less than one second for controlling and monitoring IBC processing, allowing highly efficient production with same yield as with standard technology. This forms the basis of efficiency of more than 23 percent in industrial-scale cell technologies – a level that has been reserved for tiny laboratory cells for decades.

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Images



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With the contacts soldered only to the back of the cell, IBC minimizes shadowing and achieves efficiencies of 21 percent. Reliable inspection is complicated by high metallization on the rear surface. (Image: ISFH, Germany)

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