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Solar cells: Optimised growth and sawing of crystals

Silicon wafers will soon be as thin as paper

The market for photovoltaic systems is highly competitive. In order to achieve higher efficiency and reduce costs, manufacturers are continuously optimising the production processes. The new BINE-Projektinfo brochure "Cheaper production of solar cells" (02/2017) presents two improved production processes. The first makes it possible to produce quasi-monocrystalline silicon with a significantly lower energy requirement and at the same time obtain a very pure, high-quality silicon. The second reduces the material losses when the silicon ingots are sawn into many thin slices (wafers). The new sawing technology will enable more wafers to be obtained from the same amount of silicon.

Researchers have developed a new crucible-free crystal growing process for quasi-monocrystalline silicon. Cells from this material reach an efficiency of 21 %, which is comparable to standard monocrystalline cells but with lower production costs. On the way from silicon to solar modules, the silicon ingots are sawn into thin wafers. Here a new type of diamond wire with a specially adapted cooling liquid has proved its worth. This makes it possible to saw the wafers faster and with significantly lower material losses. In addition, this system can be used to reduce the wafer thickness from the current 180 µm to 100 µm in future.

The widespread silicon photovoltaics sector will enable the optimised production processes for crystallisation and wafering to be easily integrated into existing production lines. SolarWorld Innovations GmbH (SWIN) carried out the project together with partners from the scientific community.

The BINE Projektinfo brochure, which can be obtained free of charge from the BINE Information Service at FIZ Karlsruhe, is available online at www.bine.info or by calling +49 (0)228 92379-0. The brochure cover and an additional image can also be downloaded from the press section in this web portal.

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