High Speed Laser Crystallization of Particles of Photovoltaic Solar Cells

High Speed Laser Crystallization (HSLC) is a faster, lower-cost, and more efficient post-processing technique for thin-film solar cells, which selectively crystallizes the light absorbent layer without requiring external vacuum systems.

Thin-film photovoltaic solar cells work by absorbing solar energy into a layer of semiconducting material called the light absorbent layer. A process called Rapid Thermal Annealing (RTA) is currently used to crystallize this material after fabrication, but RTA leaves behind defects that degrade the efficiency of the solar cell. RTA also requires tight thermal control and a separate vacuum/inert gas system.

Purdue University researchers have developed a new technique for crystallization of photovoltaic material called High Speed Laser Crystallization (HSLC). This method uses a laser to rapidly crystallize material in the light absorbent layer. It can be targeted at specific layers or regions of material without damaging other parts of the solar cell, and the laser does not require a vacuum/inert gas system or other external equipment. HSLC is also faster and produces fewer defects than conventional techniques like RTA.

Advantages:

-Increases efficiency of solar cells

-Post-processing is faster, reducing manufacturing time

-Can be targeted at specific layers of material

-Lowers cost by removing the need for external vacuum/inert gas system

Potential Applications:

-Solar industry

TRL: 6

Technology ID
65614

Category
Semiconductors/Fabrication & Process Technologies
Energy & Power Systems/Power Generation

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View online

Intellectual Property:

Provisional-Patent, 2010-05-24, United States | Utility Patent, 2011-05-23, United States | DIV-Patent, 2012-12-07, United States

Keywords: High Speed Laser Crystallization, HSLC, Rapid Thermal Annealing, RTA alternative, thin-film solar cells, photovoltaic material crystallization, solar cell efficiency increase, laser crystallization technique, reduced manufacturing time, low-cost solar processing, Energy, Lasers, Materials and Manufacturing, Solar