

Sharp Develops Mass-Production Technology for Triple-Junction Thin-Film Solar Cells

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Triple-Junction Thin-Film Solar Cell Module (prototype)

Sharp Corporation has successfully developed mass-production technology for stacked triple-junction thin-film solar cells by turning a conventional two-active-layer structure (amorphous silicon plus microcrystalline silicon) into a triple-junction structure with amorphous silicon (two active layers) and microcrystalline silicon (single active layer).

This new architecture boosts cell conversion efficiency from 11% to

13% and module conversion efficiency from 8.6% to 10%. Mass production is slated to begin in May 2007 at Sharp's Katsuragi Plant in Nara Prefecture.

Creating two amorphous silicon active layers significantly increases voltage levels, and structuring the cell to have three active layers in combination with microcrystalline silicon decreases light-induced degradation (drop in conversion efficiency). The result is high conversion efficiencies at the top levels in the industry, with cell conversion efficiency at 13% and module conversion efficiency at 10%.

Normally, the shift from a two-layer structure to a three-layer structure would demand an increase in production equipment, but these newly developed thin-film solar cells can be fabricated on the same equipment as conventional tandem (two-layer) cells. Consequently, the shift to multiple active layers enables increases in conversion efficiencies and thus a lower price per watt without the need for expensive, large-scale equipment.

In addition, using this triple-junction thin-film solar cell in Sharp's Lumiwall Illuminating Solar Panel, a combination of solar module and LEDs, or in transparent thin-film solar modules designed for use as architectural elements, will enable higher power output. Expectations are high that this new development will expand the range of applications for these products even further.

Source: Sharp Corporation

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