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Media Contact
Public Relations Division
Mitsubishi Electric Corporation
Tel: +81-3-3218-3380
prd.gnews@nk.MitsubishiElectric.co.jp
<http://global.mitsubishielectric.com/news/>

Mitsubishi Electric Achieves 14.8% Conversion Efficiency in Thin-film Silicon Solar Cell

Triple junction structure enables high conversion efficiency for more solar-power output

Tokyo, February 16, 2010 – Mitsubishi Electric Corporation (TOKYO: 6503) announced today that it has achieved a very high photoelectric conversion efficiency of 14.8% in a 5mm x 5mm thin-film silicon photovoltaic (PV) cell. Photoelectric conversion efficiency is the rate at which sunlight energy is converted into electric current, with higher rates meaning more output. The thin-film silicon PV cell developed by Mitsubishi Electric has a triple junction structure that utilizes a majority of the solar spectrum for higher efficiency.

At present, crystalline silicon is used commonly for PV cells. Due to their relatively high photoelectric conversion efficiency, crystalline silicon PV modules are widely used in applications with limited surfaces, such as on the roofs of residential houses. The price of silicon wafers can fluctuate greatly, however, due to changes in market demand.

Thin-film silicon PV cells are garnering attention because they use just 1% the amount of silicon material required for crystalline silicon PV cells, which helps to save resources as well as reduce costs. Although thin-film silicon PV cells are lower in photoelectric conversion efficiency than crystalline silicon PV cells, their lower product costs offer benefits for midsized and large industrial PV systems, such as those used in factories, electric power utilities and municipalities. In addition to expected growth in these fields, there is great upside potential in other fields if their efficiency can be improved in the coming years.

Multi-junction layers offer an efficient way of raising conversion efficiency in thin-film silicon PV cells because each layer absorbs different wavelengths of sunlight. It is extremely difficult, however, to adjust the characteristics of each layer in the multi-junction structure, so most thin-film silicon PV cells today are only single or double layered.

Mitsubishi Electric, however, has met a technological breakthrough to achieve 14.8% photoelectric conversion efficiency, according to its own evaluation, by using a triple-junction configuration in which the first layer absorbs short wavelengths and the third layer absorbs long wavelengths, thereby enabling the use of a wide solar spectrum from visible light to infrared rays. Key technologies that help to make this possible include:

- Semiconductor materials that tune to a particular frequency of the spectrum
- High-quality film-deposition processing for each layer
- Texture fabrication applied to transparent electrodes for optimal confinement of sunlight

Mitsubishi Electric intends to further continue its research and development with aims to raise the photoelectric conversion efficiency of its thin-film PV cells by improving cell structure, materials, processing and other factors, aiming to develop advanced PV systems that contribute to sustainable, low-carbon societies.

Background

PV systems are garnering increasing attention as a means to tackle global warming. Although the global PV market temporarily shrank from the latter half of 2008 due to the worldwide recession, it is expected to recover and continue growing after 2010.

Patents

The technologies announced in this press release encompass 118 Japanese and 16 international patents pending.

About Mitsubishi Electric

With over 85 years of experience in providing reliable, high-quality products to both corporate clients and general consumers all over the world, Mitsubishi Electric Corporation (TOKYO: 6503) is a recognized world leader in the manufacture, marketing and sales of electrical and electronic equipment used in information processing and communications, space development and satellite communications, consumer electronics, industrial technology, energy, transportation and building equipment. The company recorded consolidated group sales of 3,665.1 billion yen (US\$ 37.4 billion*) in the fiscal year ended March 31, 2009. For more information visit <http://global.mitsubishielectric.com>

*At an exchange rate of 98 yen to the US dollar, the rate given by the Tokyo Foreign Exchange Market on March 31, 2009.

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