

## R&D Initiatives

The Mitsubishi Electric Group's R&D network comprises the Advanced Technology R&D Center, Information Technology R&D Center and Industrial Design Center in Japan, and laboratories in the United States and Europe. These centers operate under the umbrella of the Corporate Research and Development Group, working in collaboration with the development departments in individual business groups. Amid severe operating conditions attributable to the current global economic recession, the components of this network collectively serve as a springboard for the development of the new and innovative products and technologies that form the foundations for future businesses.

Guided by its VI Strategy, the Mitsubishi Electric Group engages in R&D that bolsters its competitive standing while making already strong businesses such as power systems, elevators and escalators, industrial automation equipment, automotive electric and electronic components and other businesses even stronger. Efforts to enhance the Group's technological capabilities are directed toward increased differentiation, greater global competitiveness and an expanded business portfolio with new, profitable businesses. Also, with the aim of reinforcing strong businesses, we are further developing solutions in line with our AD Strategy. In addition to creating new solutions, we are fusing together a wide range of technologies as we seek breakthroughs across diverse fields, including environmental protection, energy conservation and total security provision.

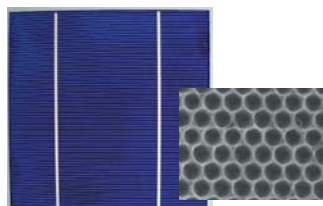
To support global development across a wide variety of businesses, we are pressing ahead to acquire intellectual property rights and standardize developed technologies in accordance with our business and development strategies. At the same time, we are pursuing active collaboration with industry, academia and government concerns through joint research with leading Japanese and international institutions and national projects in Japan.

With regard to the environment, Mitsubishi Electric formulated Environmental Vision 2021 in October 2007. Consistent with this vision, the Group will aggressively address technological challenges related to the global environment and energy conservation in photovoltaic (PV) power generation systems, heat pump applications, power devices and other strategic environmental businesses through R&D that helps realize a sustainable society.

## R&D Achievements in Fiscal 2009

### High-efficiency, High-output PV Power Generation System

Mitsubishi Electric has developed a polycrystalline silicon PV cell that applies an ultra-low-reflection honeycomb-textured structure<sup>1</sup> and a back surface reflection structure. This new PV cell achieves the world's highest conversion efficiency rate<sup>2</sup> of 18.9%<sup>3</sup>, breaking the previous world record of 18.6% posted by Mitsubishi Electric. Through the combination of the cell and its 100kW PV inverter, which achieves a power conversion efficiency of 97.5%<sup>4</sup>, Mitsubishi Electric aims to develop a large-capacity PV power generation system with higher output.



Newly developed PV cell (15cm × 15cm)

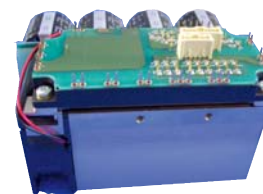


Prototype 100kW PV inverter

### High-output, Low-loss SiC Inverter

Mitsubishi Electric has developed an 11kW power inverter<sup>5</sup>, using SiC<sup>6</sup>—a material that is increasingly recognized as a next-generation, high-voltage power semiconductor capable of reducing loss in power conversion.

Compared with conventional silicon (Si)-based inverters, this new inverter reduces power loss by approximately 70%, setting a new world record<sup>7</sup> in terms of lowest loss in power conversion.



SiC inverter

### ACA Antenna System

Mitsubishi Electric has developed the ACA,<sup>8</sup> a radio telescope antenna system that boasts high tracking precision and high-speed positioning. This performance has been achieved through the use of an antenna configuration focused on lightness and high durability as well as direct-drive control using linear motors. As part of the Japan-led Atacama large millimeter array (ALMA) project in Chile's Atacama desert, the ACA system—comprising four 12-meter and twelve 7-meter synchronously operating antennas—realizes astronomical observation of unprecedentedly high sensitivity.



Photo courtesy of The Asahi Shimbun Company

1. A structure in which hemispherical concave surfaces are arranged in a honeycomb-like pattern.

2. Efficiency of conversion of photovoltaic light energy to direct current electrical energy.

3. As of February 18, 2009, based on Mitsubishi Electric internal research in the global 15-centimeter square polycrystalline cell category.

4. Power conversion efficiency of a Mitsubishi Electric 100kW-480V PV inverter at the rated load efficiency of 75%, as of February 18, 2009, based on Mitsubishi Electric internal research.

5. A device that converts direct current into alternating current at any required voltage and frequency.

6. SiC: Silicon carbide, a compound of silicon and carbon.

7. As of February 18, 2009, based on Mitsubishi Electric internal research.

8. ACA: Atacama Compact Array, an interferometric radio telescope system that integrates 16 high-precision antennas.