



# New horizons

**COVER IMAGE**

Japanese company Kyosemi has developed a spherical solar-cell technology that captures sunlight from all angles. Each sphere is a complete solar cell that can be connected to other cells using a flexible substrate.

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In a time when many industries are struggling, it is a pleasant surprise to see the solar-cell industry experiencing unprecedented growth. Almost every week there are announcements of new manufacturing capacity expansions, new contracts and new solar power plants (see page 596). But the solar industry is not one to rest on its laurels. It is continuously striving to improve solar-cell efficiencies in an effort to bring down the cost of producing electricity from sunlight. Only a few years ago solar cells were limited to efficiencies of 15–20%, but today concentrator solar cells based on multijunction photovoltaic technology are able to reach efficiencies of around 40% (see page 599). Although multijunction technology has traditionally been too expensive for land-based power plants and therefore used only in space applications, that is now changing thanks to efficient designs of solar concentrators.

We are also seeing innovative designs of solar cells that expand their use into new application areas. For example, Kyosemi in Japan is now developing sheets of miniature spherical solar cells

for use in power-generating windows (see page 602).

Cutting manufacturing costs is another way of making solar-cell technology more attractive for generating energy, and this is where the printing techniques of organic photovoltaic technology have a distinct advantage (see page 608). However, organic photovoltaic technologies are inherently less efficient than conventional semiconductor technologies. US company Solterra has now developed a suitable compromise by using quantum dot technology to combine these two approaches (see page 604). The company claims this approach gives the best of both worlds — the processability of organic technology with the ultimate promise of the efficiency of conventional semiconductor cells.

Thus, although the industry is maturing and solar power plants are springing up all over the world, there are still plenty of new, exciting technologies under development that may be the basis of the solar power plants of tomorrow. Indeed, judging from the rapid progress being made, perhaps even solar aviation might one day become feasible (see page 596).

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