PolyU powers along with top solar cell

Joey Hung

Polytechnic University has developed solar cells with the world’s highest power conversion efficiency.

The three-year project was conducted in collaboration with the Sun Yat-sen University in Guangzhou and its Institute for Solar Energy.

The solar cell combines the use of perovskite and silicon. As the two materials have different characteristics, they can absorb sunlight of different wavelengths, highly increasing the conversion efficiency of the solar cell.

The new material is lighter and at least 30 percent cheaper than the materials that are used in current solar cells.

PolyU department of electronic and information engineering professor Charles Chee Surya said: “As the perovskite cells are developed in a very fast rate among different kinds of solar technologies, it is treated as the most promising solar cell material.”

He explained that silicon can absorb sunlight with a longer wavelength, while perovskite can absorb those with shorter wavelengths. This can increase the solar cell’s conversion efficiency, which is now 25.5 percent, compared with only 3.8 percent when it first appeared in 2009.

However, Surya said there are still some limitations with the perovskite solar cells.

As the surface of the cell is not smooth, the sunlight will be scattered, he said.

The team used three approaches to maximize efficiency including the use of a chemical process to reduce the impact of material defects. A light trapping film was also used to cover the solar cell.

Charles Surya shows how the cell works. SING TAO

the pattern of rose petals to enhance the light harvesting power.

By using this material, the cost is at least 30 percent cheaper than materials used by the previous generation of solar cells.

It is estimated that the solar energy can be generated at a cost of HK$2.73 per watt compared with HK$3.90 for the existing silicon solar cells available in the market.

The cost of the power plant can be reduced from about HK$11.70 per watt to about HK$8.60.

The lifespan of the cell is around 4,000 hours at present, as the research is still ongoing. But Surya said this is the longest lifespan of solar cells that he knows.

However, he said there needs to be improvements before the cell can go into mass production. “The solar cell is now at a very early stage,” he said, estimating it will “take at least a few years” before cells can be put on the market.

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