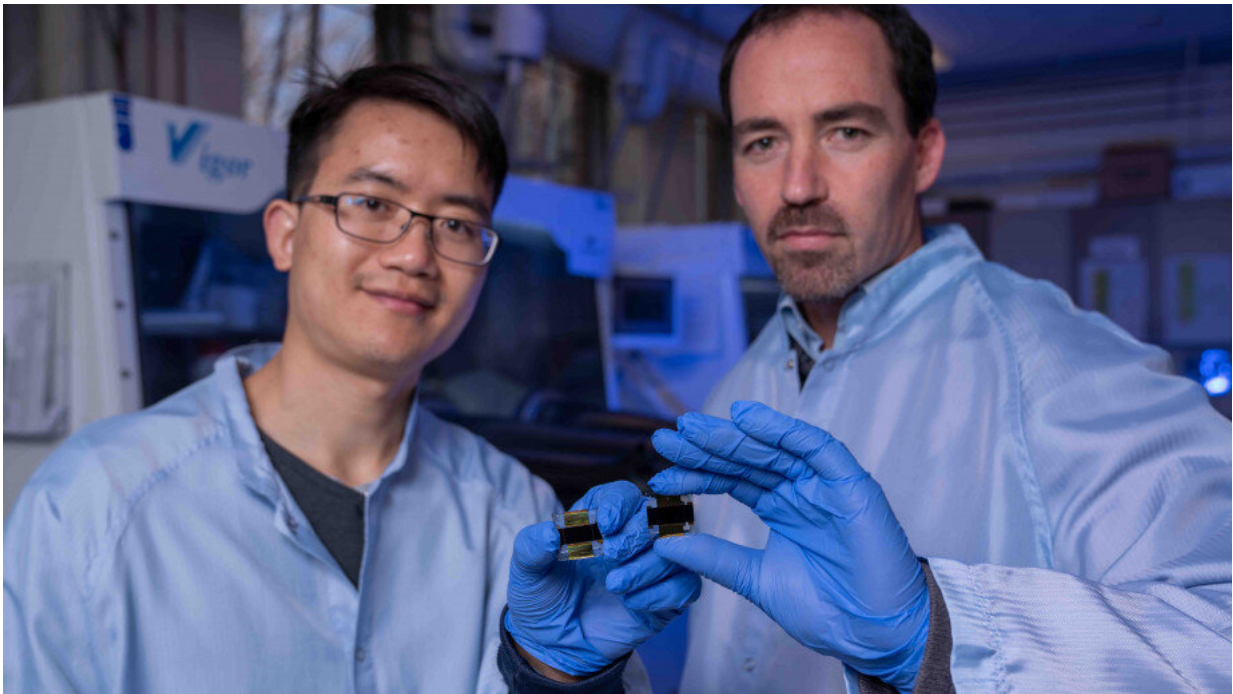


Researchers set solar record with next-gen cells

August 29 2019, by Jessica Fagan



Dr Jun Peng and Associate Professor Thomas White from the ANU College of Engineering and Computer Science. Credit: Lannon Harley, ANU

Researchers from the Australian National University (ANU) have broken new ground in solar cell energy efficiency and in the process provided a glimpse of the technology's future.

The researchers have a set a new record of 21.6 percent efficiency, the

highest ever achieved for [perovskite](#) cells above a certain size.

This means 21.6 percent of sunlight hitting the cells is converted into energy.

Associate Professor Thomas White says as a comparison, typical solar panels being installed on rooftops right now have efficiencies of 17-18 percent.

"There are three things you're trying to achieve with [solar cells](#), you're trying to make them efficient, stable and cheap," he said. "Perovskites are the future of solar cells."

"With perovskites the efficiency is now competitive, and cost is one of the big selling points. The real challenge now is making them stable enough to be used on a rooftop for example, where they have to be able to last 25 to 30 years in extreme temperatures.

"Ultimately, the aim is to combine these perovskites with silicon in a tandem solar cell. Putting the two materials together can potentially give us higher efficiencies than either one alone."

Associate Professor White and his team have been working to improve perovskite solar cells for years.

Perovskite materials combine abundant and cheap chemical elements including carbon, hydrogen, nitrogen, iodine and lead.

"Ninety-five percent of solar cells are made of silicon at the moment. It's a very, very good material, but it's going to reach the [upper limit](#) of its efficiency in the next five or 10 years," Associate Professor White said.

"To be able to make a really good tandem solar cell you've got to have

both of your cells operating as efficiently as possible. Because silicon can't get much better, we've been focusing on the perovskite half."

The new efficiency record means perovskite cells can now produce 216 watts of electrical power per square metre.

"When they're very small it's difficult to measure them accurately, and it's not necessarily representative of what would happen if you scaled up," Associate Professor White said.

"So our result is the highest on a scale that many consider the minimum—one square centimetre."

To achieve the record result, co-researcher Dr. Jun Peng developed a novel nanostructured material.

"An efficient solar cell must be able to produce both [high voltage](#) and high current," said Dr. Peng.

"It can be difficult to achieve both at the same time, but the nanostructured layer in our [cells](#) makes this possible."

The team's results were independently verified by the CSIRO Photovoltaics Performance Lab, the only laboratory in the Southern Hemisphere accredited to certify solar cell efficiencies to international standards.

This study was completed with the assistance of Australian Renewable Energy Agency funding.

Provided by Australian National University

Citation: Researchers set solar record with next-gen cells (2019, August 29) retrieved 18 April 2024 from <https://techxplore.com/news/2019-08-solar-next-gen-cells.html>

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