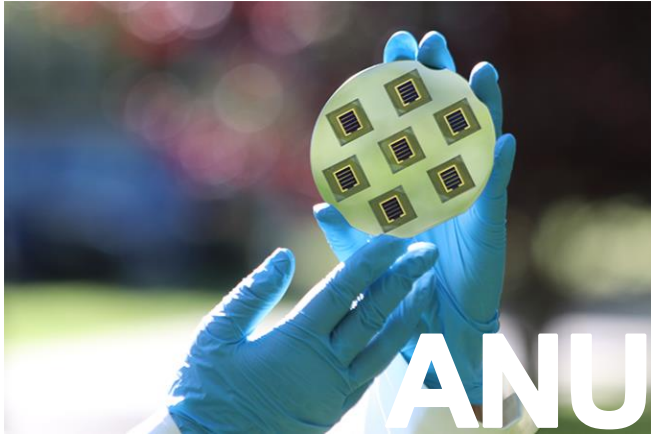


Silicon-Perovskite tandem photovoltaic cell with double-side poly-Si/SiO₂ passivating contact Si cell



Silicon solar cells are fast approaching their theoretical efficiency limit of ~30%. To meet increasing demand for renewable energy, and stay competitive, the solar industry needs to adopt the next generation of photovoltaic cells. The next generation needs to meet three criteria: higher efficiency, low costs, and a long lifespan. Perovskite Silicon tandem photovoltaics offer a promising solution to this challenge. The low cost of Perovskite materials along with their ease of deposition make them a great candidate to be applied on top of Silicon cells to capture more sunlight and increase total efficiency within the same surface area.

Researchers at The Australian National University have developed methods and designs for high performance Si-Perovskite tandem solar cells by pairing double-side-poly-Si/SiO₂ passivating contact Si bottom sub-cell and Perovskite top sub-cell.

Technology (TT2021-022)

This invention has multiple novel aspects including a novel dopant-free, low-absorptive hole transport layer, new perovskite material compositions and surface passivation approaches, as well as two novel methods of fabrication of double-side poly-Si/SiO₂ passivating contact Si solar cells.

The technology has already demonstrated an efficiency of over 29% in the lab making it one of the leading Si-Perovskite tandem technologies globally.

<https://doi.org/10.1126/sciadv.aau9711>
<https://doi.org/10.1002/aenm.201902840>

Potential benefits

- > **High Efficiency:** The tandem structure has already demonstrated certified efficiency of over 29% in the lab.
- > **Compatibility:** The design and methodologies are compatible with existing manufacturing setup of Si solar cell manufacturers focusing on poly-Si designs.

Potential applications

- > Photovoltaic/Solar Cells
- > Renewable Energy

Opportunity

ANU is exploring opportunities for partnering with Silicon, Perovskite, and Perovskite-Silicon tandem photovoltaic manufacturers to co-develop and license the technology. The inventors are also keen to capitalise on opportunities to develop a spin-out/joint venture based on this technology.

IP status

The IP is jointly owned between The Australian National University and the University of Melbourne and is subject to a provisional patent filing.

Key research team

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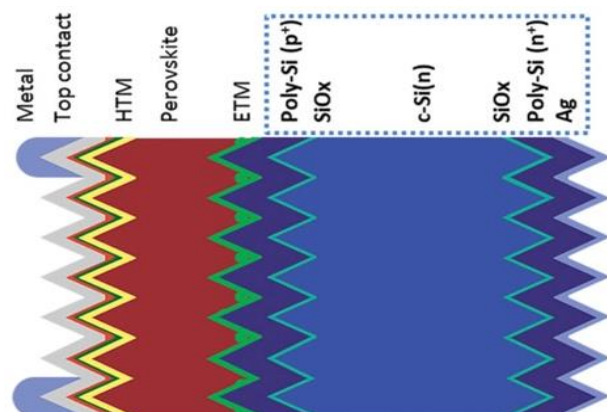


Figure 1: a) Schematic of tandem using Si bottom cell with dual-side poly-Si/SiO_x passivating contact (p-type poly-Si/SiO_x at the front and n-type poly-Si/SiO_x at the rear)