Singapore Team Develops Highest Power Conversion Perovskite Cells

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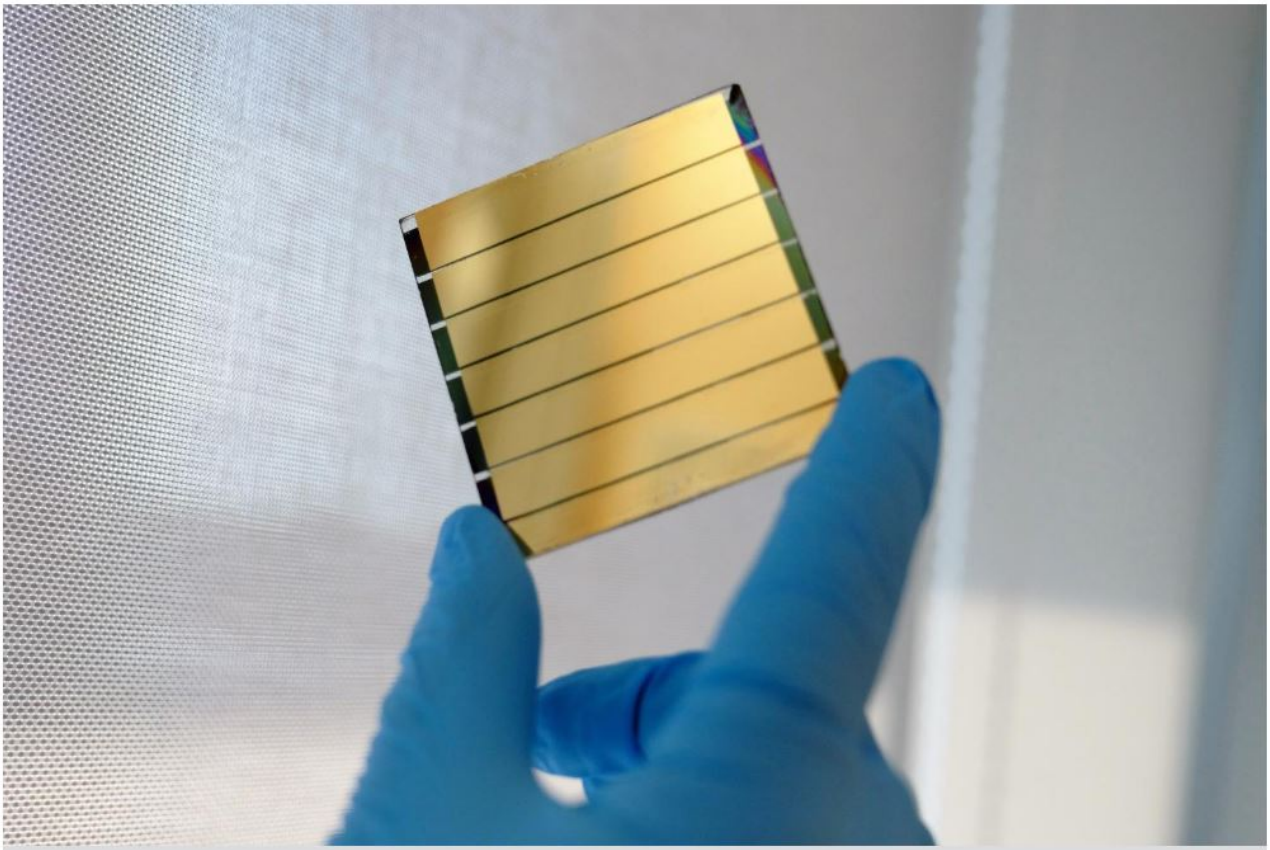

Thermal co-evaporation method can fabricate solar cell modules of 21 cm^2 size with conversion efficiencies of 18.1 per cent.

"Our work demonstrates the compatibility of perovskite technology with industrial processes, and its potential for market entry. This is good news for Singapore, which is looking to ramp up the use of solar energy for its power needs."

Research fellow at ERI@N and first author, Jia Li said, "We have demonstrated the excellent scalability of co-evaporated perovskite solar cells for the first time. This step will accelerate the transition of this technology from laboratory to industry."

More surface areas to harness sunlight with coloured perovskite solar cells

Utilising the same technique, the researchers then fabricated coloured semi-transparent versions of the perovskite solar cells and mini modules, which achieved similar measures of power conversion efficiency across a whole range of different colours.

These results demonstrate the versatility of the thermal evaporation method in producing a variety of perovskite-based solar devices for a variety of optoelectronic applications.

NTU associate VP (Strategy & Partnerships), Subodh Mhaisalkar, another author of the paper, said the findings open doors for Singapore and urban environments in other countries to harness the power of sunlight more efficiently than ever before.

"The solar mini modules can be used on facades and windows in skyscrapers, which is not possible with current silicon solar panels as they are opaque and block light. Building owners will be able to incorporate semi-transparent coloured solar cells in the architectural designs to harvest even more solar energy without compromising the aesthetic qualities of their buildings" said Mhaisalkar who is also executive director of the Energy Research Institute @ NTU (ERI@N).

Providing an independent view, Armin Aberle, CEO of the Solar Energy Research Institute of Singapore (SERIS) at the National University of Singapore (NUS) said, "This work represents the first demonstration of highly efficient large-area perovskite solar cells fabricated by an industrially compatible process. We are working closely with NTU in the future development of 30 percentefficient perovskite-on-silicon tandem solar cells in Singapore."

The NTU team is now looking at integrating perovskite and silicon solar cells to create a tandem solar cell. Such a configuration fabricated using cost-effective and scalable processes can substantially increase the solar electricity production per unit area while keeping production costs low.

'Highly Efficient Thermally Co-Evaporated Perovskite Solar Cells and Mini-modules' by Jia Li et al, Joule, 2 Apr 2020.