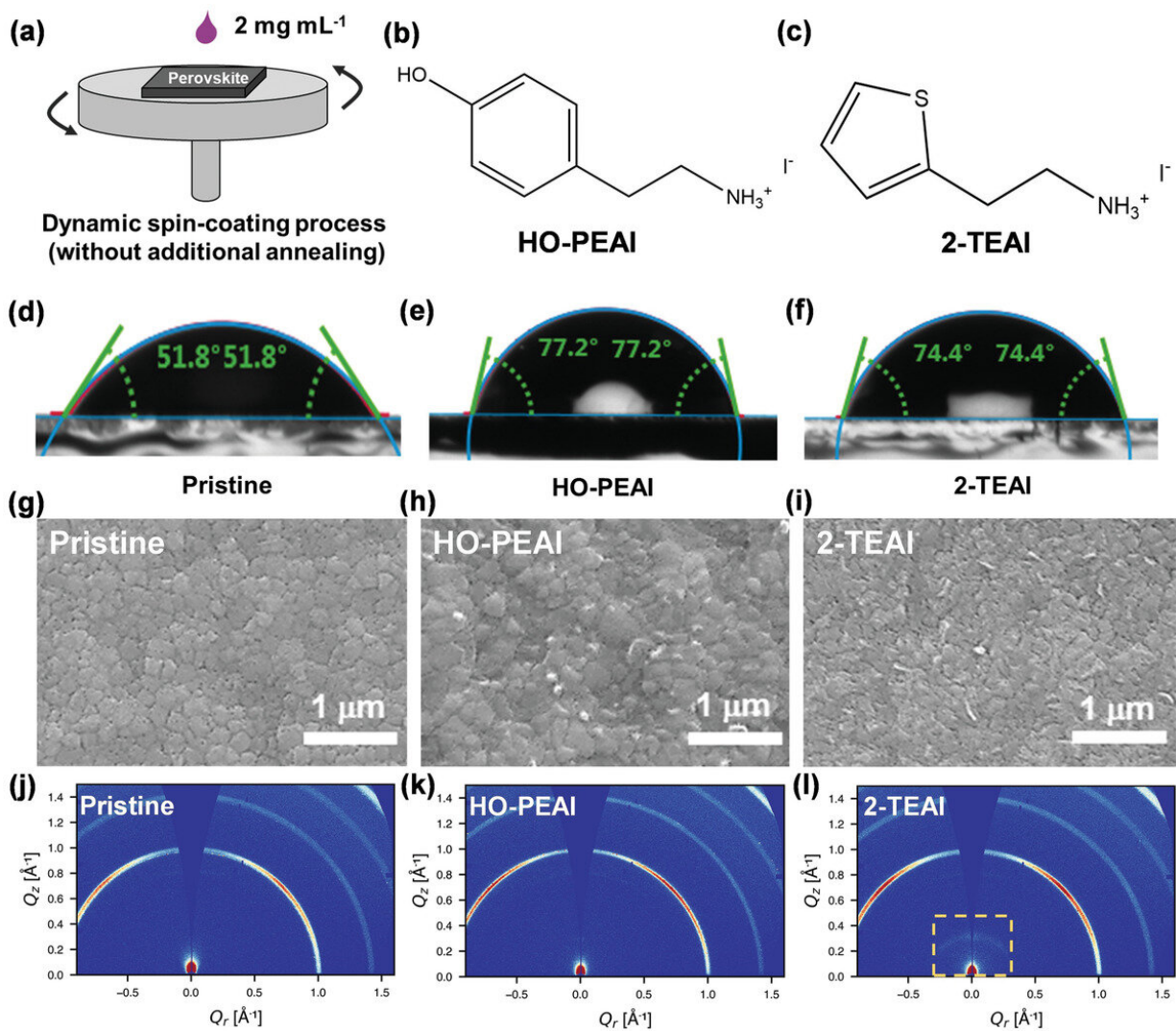


Simple semiconductor solutions could boost solar energy generation and enable better space probes

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Properties of perovskite films without and with surface modulators. a)

Preparation process. b,c) Chemical structure of HO-PEAI and 2-TEAI. d–f) Contact angles. The figures were captured at 5 s after dropping water on the perovskite surface. g–i) Top-view SEM images. j–l) 2D GIWAXS patterns collected with an incidence angle of 0.3° (penetration depth of ≈ 50 nm, details in Supporting Information). Note that the yellow square highlights the weak scattering ring caused by the quasi-2D structure. Credit: *Advanced Energy Materials* (2022). DOI: 10.1002/aenm.202202868

A "simple" tweak to perovskite solar cells during the fabrication stage could help to unlock the untold potential of the renewable energy source, claims research from the University of Surrey.

Surrey's Advanced Technology Institute (ATI) has demonstrated that by precisely controlling the fabrication process, it is possible to regulate and reduce unwanted energy loss in perovskite solar panels.

Dr. Bowei Li, a lead researcher of the program at the Advanced Technology Institute, University of Surrey, said:

"The future of perovskite [solar panels](#) is incredibly exciting, with the promise of not only improving the performance of solar farms and roof panels but many opportunities in powering spacecraft and interstellar probes."

"We hope the relatively straightforward approach demonstrated in our study, which tackles recombination losses, can improve the reproducibility, efficiency and stability of perovskite [solar cells](#)."

Perovskite solar cells are widely considered the natural successor to silicon-based solar devices because of their high energy conversion efficiency, low development cost, and lightweight nature. Named after a naturally occurring mineral with a structurally similar chemical formula,

perovskites are synthetic composites with three-dimensional lattice crystal structures.

The University of Surrey's Advanced Technology Institute is a global leader in research into perovskite solar cells and their contribution to boosting global clean energy generation.

Dr. Wei Zhang, the primary supervisor of the research from the University of Surrey, said, "Perovskites are wonderful semiconductor materials enabling the revolution of next-generation photovoltaic technologies. However, despite unprecedented success in many emerging applications, their full potential has yet to be unlocked."

"Our work will foster the understanding of the complex interplay between the passivators and perovskites at the material interfaces and take the perovskite photovoltaics to new heights."

Professor Ravi Silva, the co-supervisor of the research program and Director of the ATI at the University of Surrey, said, "Net-Zero is impossible if [solar energy](#) isn't a crucial component of the mix. Solar energy is currently the leading technology for large-scale inexpensive green energy harvesting worldwide."

"The ATI, and indeed the University of Surrey, is dedicated to making sure that this [perovskite](#) technology complements conventional solar modules and is central to the sustainability requirements for tomorrow's world."

The research has been published by *Advanced Energy Materials*.

More information: Bowei Li et al, Suppressing Interfacial Recombination with a Strong-Interaction Surface Modulator for Efficient Inverted Perovskite Solar Cells, *Advanced Energy Materials*

(2022). [DOI: 10.1002/aenm.202202868](https://doi.org/10.1002/aenm.202202868)

Provided by University of Surrey

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