Radiative Thermal Annealing/*In-Situ* X-ray Diffraction Study of $MAPbI_3$ (PV-3)

A joint India-U.S. research consortium funded under the *Joint Clean Energy Research & Development Center (JCERDC)*

Scientific Achievement:

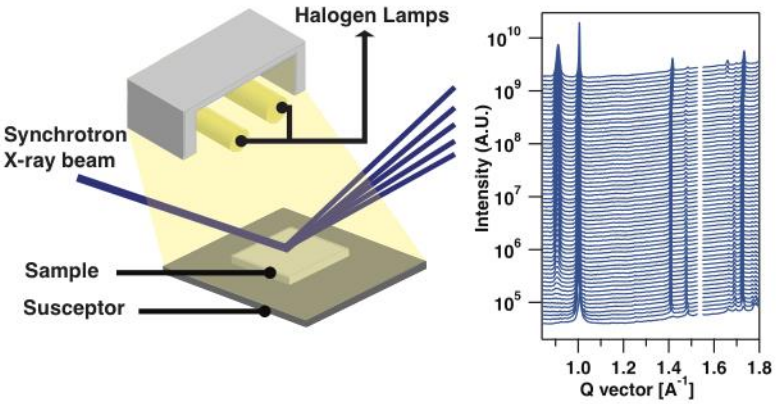
Using *in-situ* synchrotron X-ray diffraction to comprehensively understand the $MAPbI_3$ formation/ degradation dynamics during radiative thermal annealing, and the effect of such dynamics on the performance of the resulting solar cells.

Significance and Impact:

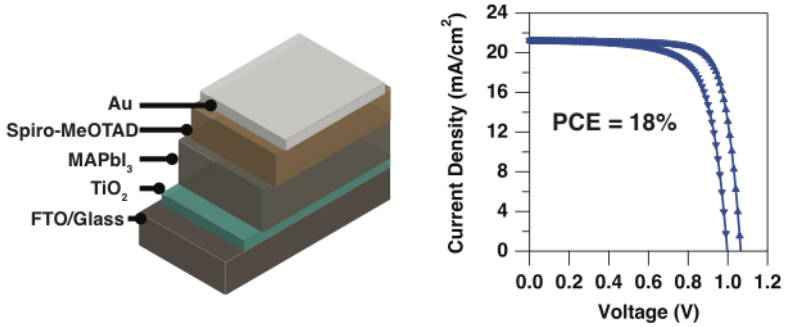
Offer rich insights into the fundamental crystallization process of perovskite materials, address thermally induced instabilities, making it invaluable in producing high-efficiency perovskite solar cells.

Research Details:

- Apply a highly scalable radiative thermal annealing for $MAPbI_3$-based perovskite solar cells.
- Elucidate the role of the antisolvent in forming high-quality $MAPbI_3$ films.
- Study the effect of humidity, annealing temperature profile, film substrates on growing $MAPbI_3$ film.



Radiative thermal annealing/*in-situ* XRD setup and resulting XRD data.



Perovskite solar cell device structure and performance.

Publication: B. Dou, V.L. Pool, M.F. Toney, and M.F. van Hest, Radiative Thermal annealing/in-situ X-ray diffraction study of methylammonium lead triiodide: Effect of antisolvent, humidity, annealing temperature profile, and film substrates, *Chemistry of Materials* **29**(14), 5931–5941 (2017). **DOI:** 10.1021/acs.chemmater.7b01467

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