PEROVSKITE PHOTOVOLTAICS

High-speed films

Sci. Adv. **5**, eaax7537 (2019)

Rapid advancements in perovskite solar cell technology have attracted industrial interest. This has presented the challenge of translating device performance obtained on small research cells to large commercial modules. In an industrial context, the active layer is ideally deposited under ambient conditions using high-throughput technologies such as roll-to-roll manufacturing. However, rapid crystallization of perovskite at low temperature generally results in films of poor quality, which lead to low device efficiency. Now, Jinsong Huang and colleagues at the University of Nebraska-Lincoln and the University of North Carolina at Chapel Hill in the USA demonstrate that using a combination of volatile and non-volatile solvents allows rapid fabrication of a high-quality perovskite module at room temperature.

Huang and team show that a mixture of highly volatile solvents, acetonitrile and 2-methoxyethanol, ensures fast deposition while the non-volatile solvent, dimethyl sulfoxide, coordinates with the perovskite precursor ions. The latter form an intermediate phase that evolves into a highly crystalline large-grain perovskite upon annealing. The team demonstrate a uniform perovskite layer deposited over an area of 225 cm^2 at a blade coating speed of 99 mm s^{-1}. The high-quality of the film enables a 16.4%-efficient module with an aperture area of 60 cm^2 to be fabricated and ensures device stability under both continuous illumination and reverse bias conditions. The work of Huang and colleagues addresses key challenges of scalability yet leaves room for improvements in the compatibility of device processing with industrial manufacturing.

Giulia Tregnago

Published online: 22 January 2020
https://doi.org/10.1038/s41560-019-0542-8