

Perovskite solar cell manufacturing process

Communications Materials - The scalable and cost-effective synthesis of perovskite solar cells is dependent on materials chemistry and the synthesis technique. This Review discusses these...

In order to bring perovskite solar cells into the commercial market, it is necessary to improve and optimise the current fabrication methods and conduct further research. Combining or optimizing technologies is typically needed to balance performance, cost, and manufacturing efficiency.

We decided to explore the possibility of designing a simple and efficient manufacturing process for PSC panels. Hence, we designed a small-scale, automated pilot line for the manufacture of perovskite solar panels based on slot-dye coating of active layers, conducted partly under a nitrogen atmosphere.

We developed an innovative low-cost Perovskite solar cell manufacturing machine (MK-20), using once-through process which can continuously carry out thin-film coating and fast heat...

In the last two decades, organic-inorganic halide-based third-generation perovskite solar cell (PSC) has received wide attention among researchers owing to better efficiency, low-cost fabrication and band gap tunability. The performance and stability is affected by device architecture and quality of deposited layer, which in turn affects the ...

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Alternatively, a better way to reduce the risk of harmful effects on human health and the environment from such antisolvents, would be to develop a new process that does not require an antisolvent. To accomplish this goal, complete understanding and sophisticated control of the crystallization behavior of the perovskite layer is required. The new process should mimic the pre-nucleation, burst nucleation, and following growth by diffusion processes, using the solvent dripping method to achieve a high-quality, uniform perovskite layer.

Previous works have mainly focused on replacing DMF with another solvent. Ketones (gamma-butyrolactone (GBL), gamma-valerolactone (GVL)), alcohols (ethanol or 2-butoxyethanol (2-BE)), and acetonitrile (ACN) have been reported. Representative reports on the usage of such eco-friendly solvents as main solvents are given below, and recent reports on the usage of DMF-alternative main solvents since 2021 are summarized in Table 2.

ACN has a solubility to perovskite precursors due to polar cyano group, but its limited solubility is an obstacle

to be used solely as a main solvent. In previous works, ACN is typically mixed with another co-solvent to improve its solubility. The fumigation of methylamine in gaseous state resulted in an enhancement of solubility via melting of precursors to form a liquid mixture with methylamine[40]. Mixing with tetrahydrofuran (THF) [41] or 2-methoxyethanol (2-ME) [17] is also reported to improve the overall solubility, but toxicity of THF or 2-ME can be also problematic.

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