International Advanced Research Centre for Powder Metallurgy & New Materials (ARCI)

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Quasi-2D perovskite solar cells

Overview

The instability of perovskite solar cells against moisture, light and heatremains the main stumbling block towards the commercialization of this technology. One of the promising strategies is to lower the dimensionality of perovskites from three-dimensional (3D) to two-dimensional (2D) which presents higher stability against the ambient environment. The conductor layers are isolated from one another by incorporating R–NH₃, a large aliphatic or aromatic alkyl ammonium spacer cation. The insertion of insulating spacer cations gives 2D layered perovskites unique properties compared to their 3D counterparts. The hydrophobic nature of the organic spacer imparts 2D perovskites with superior moisture stability, these quasi-2D perovskites are used as absorber layers to impart highly efficient and stable perovskite solar cells.

Key Features

- High stability towards moistureTunable bandgap
- **Potential Applications**
 - Off-grid power supply
 - Building integrated photovoltaics (Smart windows, roof, tiles)
 - Solar road studs

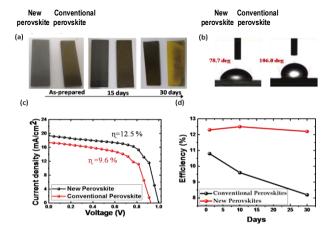


Figure: a) ambient atmosphere stability studies, b)Contact angle measurement, c) Photovoltaic performance, d) photovoltaic stability

Major Patents/Publications

Patent search under process

IPDI*	1	2	3	4	5	6	7	8	9	10
Activities	Basic concepts and understanding of underlying scientific principles	Short listing possible applications	Research to prove technical feasibility for targeted application	Coupon level testing in stimulated conditions	Check repeatability/ consistency at coupon level	Prototype testing in real-life conditions	Check repeatability/ consistency at prototype level	Reassessing feasibility (IP, competition technology, commercial)	Initiate technology transfer	Support in stabilizing production
Status										