Quasi-2D perovskite solar cells

Overview

The instability of perovskite solar cells against moisture, light and heat remains 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 moisture
- Tunable 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