

Towards Roll-to-Roll Coating of Perovskite Photovoltaics

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Metal halide perovskites have emerged as a highly promising solar cell technology with high light to electricity power conversion efficiency and low processing cost due to their solution processability. However, to make perovskite solar cells commercially viable, particularly to compete with or build upon the traditional silicon dominated photovoltaic market, substantial progress is needed in improving their process techniques and scalability. Fabricating perovskite devices and modules in a roll-to-roll process on flexible substrates will enable high throughput manufacturing, and it will also allow the application space to be extended beyond what is available to rigid geometries. We investigated the performance of flexible perovskite solar cells with various transparent conductors, including indium tin oxides (ITO) and indium zinc oxides (IZO), on thin (100 μ m) flexible glass substrates. Progress of scaling up solution processed perovskites to larger areas, sheet-to-sheet and roll-to-roll, on flexible substrates and challenges with this will be discussed For device structures of flexible glass/ITO/TiO₂/mixed cation perovskites/Spiro-OMeTAD/MoO_x/Al, sheet-to-sheet coated, a power conversion efficiency over 18% was demonstrated. For roll-to-roll coated devices, efficiencies over 14% have been achieved.

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