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(POS-69) Synthesis of Perovskite-Based Materials for Photovoltaics Application

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Hybrid organic-inorganic metal halide perovskite have bypassed the power conversion efficiency (PCE) of silicon photovoltaics since it emerged ten years ago. Because of their easy processing and fabrication under ambient environment, it is a promising next generation photovoltaic technology. To further improve PCE, one of the practical approaches is to include the use of organic material, which generally acts as charge extractor from the perovskite photoactive layer. However, the cost of organic-based hole transporting materials (HTMs) and their long-term environmental stability could hinder their further commercial application. Thus, there is an urgency of introducing a new approach to replace organic-based HTM within PSC.
In this report, we have fabricated different types of PSC without the use of any organic HTM material. In particular, MAPbBr3 based perovskite are being synthesized and uses it for HTM-free PSC application. In addition, mixed halide perovskites are synthesized by varying molar ratio of organic and inorganic precursors, that leads to perovskites with higher PCE, and improved stability as compared to the equimolar ratio of precursors. To further improve the PV performances, additive incorporation within perovskites are also being explored. In the case of MAPbI3-based HOIP, MAPbI3-20FACl shows the best PCE among the other compositions of FACl. On the other hand, for CsPbIBr2-based total inorganic perovskite, CsPbIBr2-10MACl shows a higher PCE than the other compositions.

Keyword-1

low dimensional

Keyword-2

additive incorporation

Keyword-3

stability

Primary authors: Dr GAO, Dr. Jianbo (Brock University); Dr GHOSH, Dr. Tuhin (Brock University)

Presenter: Dr GHOSH, Dr. Tuhin (Brock University)

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