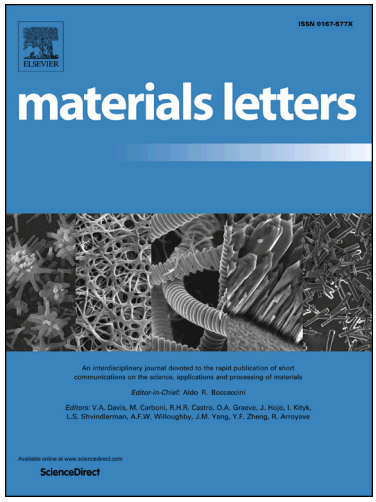

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Semi-transparent Cl-doped perovskite solar cells with graphene electrodes for tandem application

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Abstract

The purpose of this study is to develop semi-transparent perovskite solar cells using graphene electrodes for high-efficiency tandem application. Two layers of graphene was considered optimum for perovskite solar cells, and this was confirmed by evaluating the optical and electrical performance. The tandem cells were further studied by controlling the thickness of perovskite films using different spin speeds, and 3000 rpm was considered the optimum speed. The bandgap of Cl-doped perovskite thin films was 1.59 eV. Measurement of morphology and crystal structure confirmed a good level of crystallinity. This study also examined both the optical and electrical performance of the semi-transparent perovskite solar cells, to optimize the power conversion efficiency (PCE) of the tandem application using silicon solar cells. To the best of our knowledge, the tandem cells demonstrated a total PCE of 18.1%, which is the highest value among those of other cells that have the same structure as that of tandem cells.

Keywords: Perovskite Solar Cells; Graphene; Tandem; Energy storage and conversion;