

Application of nanoporous Au film as electrodes for high efficient perovskite solar cells

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The rapid progress of organic–inorganic perovskite solar cells (PSCs) in recent years has attracted considerable attention [1–4], and the power conversion efficiency (PCE) of PSCs has been increased beyond 23.0% [1]. For high efficiency PSCs, the metal electrodes, such as Au, Ag, Al and Cu were typically used. However, in the deposition of these metal electrodes, the rigorous conditions, i.e. extremely high vacuum, are required due to the low thermal stability of organic-inorganic perovskite and organic carrier extraction materials. Therefore, it is quite necessary to find a simple approach to realize the metal electrodes of PSCs without high vacuum condition, especially for the industrial application.

In this study, we successfully achieved high efficient PSCs by employing a simple fabrication process of nanoporous Au film as the electrode. We prepared Au-Ag alloy film and etched out Ag-component using high concentration of the nitric acid. The prepared and dried nanoporous Au film was pasted on the perovskite film surface and separated it from membrane film by dried ethanol solvent in air condition. Figure 1 shows current density-voltage (J - V) curves of PSCs using nanoporous Au film as the electrode. The PSCs with nanoporous Au electrode achieve high PCE of 17.5% with 0.03 cm² active area, respectively. These results demonstrate that the high photovoltaic performance of PSC can be realized using nanoporous Au electrode fabricated by simple process in the air condition.

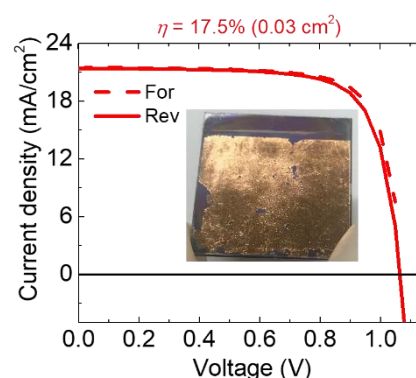


Figure 1 J - V curves of PSCs with nanoporous Au electrode.

References

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