Short Communication

Properties of TiO₂ Film Prepared by Anodization as Electron Transport Layer for Perovskite Solar Cells

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The photovoltaic performance of perovskite solar cells (PSCs) largely depends on the characteristics of the electron transport layer (ETL). However, conventional solution-based processes may lead to obvious voids or cavities on the film. In this publication, an anodization process was proposed to transform a layer of Ti sputtered on a fluorine-doped indium tin oxide (FTO) substrate to TiO₂ nanotubes as an ETL for PSCs. Through a one-step anodization process in an electrolyte of ethylene glycol with NH₄F and H₂O, an integrated 500-nm-thick layer composed of a TiO₂ nanotube layer (mesoporous layer) and a TiO₂ compact layer was obtained. This method was simple and more efficient than the spin-coating process, and there were no traps between nanotube layer and compact layer. PSCs based on this ETL achieved the highest efficiency of 12.82%, which was comparable to devices whose ETLs were fabricated by a conventional spin-coating process.

Keywords: perovskite solar cells, electron transport layer, anodization process, TiO₂ nanotube

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