Bridging the Grain Boundaries of $MAPbI_3$ by F4TCNQ Additive Treatment for Achieving Improved Fill Factor of Ambient Air Fabricated Inverted Perovskite Solar Cells

코타 아쉬크, 김은비, 신형식, 서형기†
전북대학교
(hkseo@jbnu.ac.kr†)

Perovskite solar cells (PSCs) have attracted considerable attention among various new generation photovoltaic technologies due to their easy and low-cost solution manufacturing process with high power conversion efficiency (PCE). Currently, several research works are going on to enhance the efficiency of perovskite solar cells to the Shockley–Queisser limit. However, the fabrication process is usually carried out inside a glovebox to avoid moisture, because methylammonium lead iodide (MAPbI3) perovskites are easily dissolved in atmospheric water vapor. In this study, we present a one-step fabrication under endurable humidity (relative humidity ~50%) to achieve high-quality perovskite grains by using F4TCNQ as an additive into the MAPbI3. The presence of F4TCNQ bridges the gaps between the MAPbI3 grain boundaries and improves the fill factor and short circuit current compared to the basic MAPbI3 devices. We fabricated both small area, large area devices and module with humid conditions. This method presents a new way of controlling the growth of perovskite films in humid environments.