

Solution-processed pentacene anode interfacial layer in vacuum free fabrication process of organic solar cell with an alternative liquid eutectic GaIn electrode

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An anode interfacial layer of pentacene between active layer and metal cathode in vacuum-free fabrication process of PTB7:PCBM organic photovoltaic cells (OPVs) used with an alternative liquid eutectic GaIn (EGaIn) electrode was investigated in this paper. Pentacene thin films were formed by spin-casting a saturation solution of pentacene in isobutanol onto the surface of ITO. Fourier transform-infrared spectroscopy (FTIR) and X-ray photoelectron spectroscopy (XPS) was performed to confirm the existence of the ultra-thin pentacene layer. Changes in morphology of the ITO surface after the deposition of pentacene are probed with atomic force microscopy (AFM) and optical microscopy (SEM). We found that the short circuit current (J_{sc}), and consequently the power conversion efficiency (PCE), of organic solar cell was significant increased by inserting a pentacene layer. The improvement in device performance can be attributed to the pentacene layer, which could help improve the morphology of the active layer, not for improving the hole charge mobility and collectivity.