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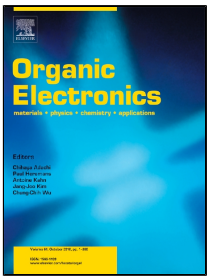

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An efficient solution-processed hole injection layer with phosphomolybdic acid in quantum dot light-emitting diodes

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Abstract

We have successfully employed solution-processed phosphomolybdic acid (PMA) as an efficient hole injection layer (HIL) in quantum dot light-emitting diodes. With its low price, simple solution processing, good physical and optical properties, PMA is a good candidate as a HIL in optoelectronic devices. Compared to the device with widely used Poly(3,4-ethylenedioxyth-iophene):poly(styrene-sulfonate) (PEDOT:PSS) as a HIL, the PMA-based device possesses much higher current density and lower driving voltages, demonstrating a superior hole injection ability. Besides, the annealing temperature and atmosphere have strong influences on Mo^{6+}/Mo^{5+} ratio and work function of PMA film, resulting in different hole injection property. Consequently, with the optimized PMA as a HIL, the device obtains a dramatically lower turn-on voltage of 2.7 V, along with a 65.4% improvement on maximum power efficiency compared to that with PEDOT:PSS.

Keywords: Phosphomolybdic acid, hole injection, annealing temperature, annealing atmosphere