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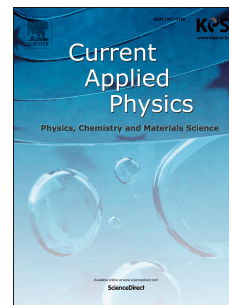
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Enhanced Efficiency and Stability of Polymer Solar Cells using Solution-processed Nickel Oxide as Hole Transport Material

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Abstract

Solution-processed nickel oxide (s-NiO_x) was synthesized for use as hole-transport layers (HTLs) in the fabrication of polymer solar cell (PSC) devices. The s-NiO_x thin-films were deposited using spin-coating and post-annealed at 300 °C, 400 °C, or 500 °C. With increased annealing temperature, the nickel acetate precursor decomposes more fully and forms s-NiO_x films that show larger crystalline grain sizes with lower root mean square surface roughness. Bulk heterojunction solar cells fabricated with the new random polymer RP(BDT-PDBT) and [6,6]-phenyl-C₇₀-butyric acid methyl ester (PC₇₀BM) using s-NiO_x as HTLs exhibit a 4.46% enhancement in power conversion efficiency and better stability compared to conventional PSCs using poly(3,4-ethylenedioxythiophene):poly(styrene sulfonate) as HTLs. We believe that the solution-processable and highly stable s-NiO_x could be a potential alternative for functional interface materials in optoelectronic devices.

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