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Carbon Nanotube Network As Stable and Efficient Electron Blocking Layer and Transparent Conductive Electrodes for Solar Cells

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Abstract Text:

Films of single-walled carbon nanotubes (SWNTs) network are promising flexible transparent-conductive electrode for various types of solar cells. Furthermore, adequately p-doped SWNTs network can also act as a stable conductive electron blocking layer (EBL). We have demonstrated these characteristics in honeycomb-structured SWNTs-Si solar cells [1], dry-deposited SWNTs-Si solar cells [2], graphene-Si solar cells, organic solar cells (OSC) [3,4], and perovskite-type solar cells [5]. Millimeter-scale single crystal graphene [6] also exhibits similar properties as SWNTs networks. Air-stable power conversion efficiency (PCE) of about 11 % are demonstrated for SWNT-Si or graphene-Si solar cells without the intentional doping. PCE about 5 % can be obtained for inverted and normal organic solar cells. The EBL and electrode functions of SWNT network were also demonstrated in normal and inverted type perovskite solar cells with over 9% PCE.

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