

Single-Walled Carbon Nanotubes and Graphene as Hole Transport Layer & Electrode for Solar Cells

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I will discuss the application of single-walled carbon nanotubes (SWNTs) and graphene as hole transport layer and transport electrode in various kinds of solar cells including honeycomb-structured SWNTs-Si solar cell [1], dry-deposited SWNTs-Si solar cell [2], graphene-Si solar cells, organic solar cell (OSC) [3] and perovskite-type solar cells [4]. Using millimeter-scale monocrystalline single-layer graphene and honeycomb-structured SWNT network, the nanocarbon-Si solar cell demonstrated the air-stable power conversion efficiency (PCE) of 11.6% before any intentional doping process. For organic solar cells, the SWNT/MoO_x/PEDOT:PSS nanocomposite was proposed and developed as hole transport layer and electrode replacing ITO. Using PTB7/PC71BM mixture as active materials, the PCE of 6% was obtained for on glass substrate and 3.89% on flexible PET substrate. The hole transport and cathode function of SWNTs was also demonstrated in perovskite solar cells with over 9% PCE. The dual functional behavior of SWNT and graphene will be discussed.

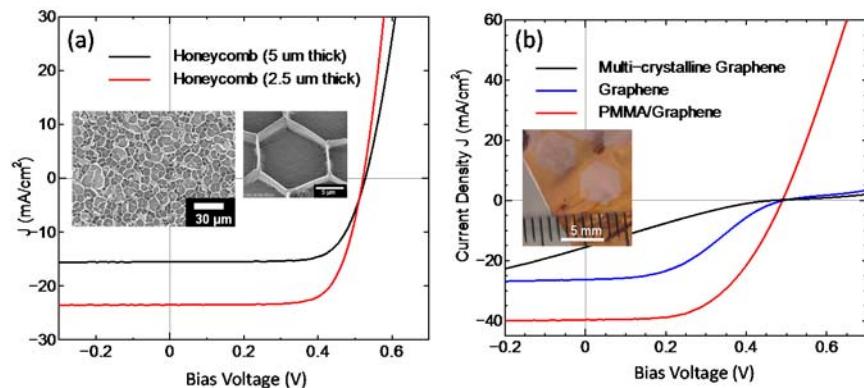


Figure 1. (a) Honeycomb structured SWNT/n-Si solar cell. (b) Graphene/n-Si solar cell.

References:

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