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Optoelectronic properties and structural dependence of carbon nanomaterials-based hybrid organic photovoltaic devices

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We report on the incorporation of carbon nanomaterials (CNMs) such as single-walled carbon nanotubes (SWCNTs) into organic PV (OPV) cells for efficiency optimization. Although CNMs have been used before in OPVs, the focus is put here to elucidate the effect of the structural properties of the CNMs on OPV performance, which is poorly understood. More specifically, we address the issue of improving the performance of a new hybrid OPV device by combining the physical and chemical characteristics of light-sensitive conjugated polymers (CP), with the high electrical conductivity of SWCNTs by blending the both in a composite photoactive layer. The focus is put on exploring in depth the electronic and optoelectronic properties of the composite material in an OPV scheme and exploring its corresponding photo-conversion capability. The root-mean-square roughness, photoluminescence and optical absorption were found to increase with increasing SWCNTs content and a non linear correlation between the nanotubes loads and the open circuit voltage VOC was clearly pointed-out.

Are you currently a postgraduate student? (Yes/No)

No

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