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Carbonized bamboo–derived carbon nanodot as efficient cathode interfacial layers realized high performance organic photovoltaics providing power conversion efficiencies up to 9.6%

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We prepared water-dispersed carbonized bamboo–derived carbon nano–dot (CND) via thermal dissociation, and following by aqueous extract process. The CND shows high photoluminescence properties at a λem of 430 nm with a particle size of ca. 3-5 nm and containing either COOH or OH functionality. We have found that this CND can served as cathode interfacial layer (IFL) and efficiently increases the power conversion efficiency (PCE) of both fullerene and nonfullerene based organic photovoltaics (OPVs). The embedding of CND showed the effect on the altering the work function and surface roughness of ZnO. The variation of surface status for ZnO/CND further affected the morphologies of the active layers, and the charge selectivity and transportation, thus facilitated the electron transport and extraction of OPV devices providing increase in the fill factor (FF) and short circuit current density (J_{sc}). The greatest OPV performance was that of the PTB7-Th:$PC_{71}BM$ device incorporating CND—a PCE of 9.6% and a remarkable *FF* of 72.8%. This performance is one of the best PCE used carbon based IFL materials.

Biography

Chih-Ping Chen's research led to 64 SCI publications with >3000 citations (with an H-index of 31), including two ESI highly cited papers in The Journal of the American Chemical Society, and Nano Letters. He has 10 granted patents.

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