

Graphene Base Invert Solar Cells with Highly Conductive and Dispersible Halogen doped Graphene Oxides

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In this study, we have demonstrated, that simple charge carrier amplification of the rGO doped with halogen molecules (I, Br, F) could enhance the charge extraction and carrier property in BHJ solar cells. The inverted devices based on GO hole- and D-rGO electron-extraction layers in active layer all outperform the corresponding standard BHJ solar cells with the state-of-the-art hole- and electron-extraction layers. Here, we report a 48% improvement in the performance of inverted solar cells with incorporation of zinc oxide (ZnO) and D-rGO composites. The D-rGO nanocomposites show higher electron conductivity than intrinsic ZnO; moreover, they show reduced contact resistance at the interface between the active layer and n-type buffer layer. Thus, power conversion efficiency of 3.89% was achieved for the inverted solar cells with a D-rGO nanocomposites layer in Glass/ITO/ZnO /P3HT:D-rGO/GO/Ag device.