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Low Dimensional Nanomaterials-Based Interfacial Engineering in Organic Solar Cells

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We have demonstrated a facile but efficient preparation of a solution-processable transition metal oxide nanoparticles or nanosheets-incorporated reduced graphene oxide (TMONP/RGO or TMONS/RGO) and excellent organic photovoltaic cells using the TMONP/RGO or TMONS/RGO to function as a hole extraction layer (HEL). The TMONP/RGO or TMONS/RGO, featuring uniformly decorated high-quality TMONPs or TMONSs on RGO, can be synthesized via a simply adding a precursor solution into RGO prepared by an electron beam irradiation method. Compared with the reference PEDOT:PSS-based cells, the TMONP/RGO or TMONS/RGO HELs provide superior performance characteristics as a result of better electrical conductivity and more uniform film quality than that of PEDOT:PSS. In particular, the high performance can be realized irrespective of the thermal treatment conditions of a solution-processed TMONP/RGO or TMONS/RGO layer, which is a crucial difference from the previously reported solution-processed metal oxide-based HELs. These results clearly demonstrate that the TMONP/RGO or TMONS/RGO, prepared by a facile and efficient method, is a promising hole-transporting material and a potential alternative to PEDOT:PSS, thus further realizing an efficient and stable OSCs.

Country/Organization invited to participate

Korea, Republic of

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