

Solar Energy

Metal oxides and noble metals application in organic solar cells

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Abstract

The integration of noble metals nanostructures can be an effective method to improve the performance of organic solar cells by scattering the incident light that reaches the active layer. The resulting elongated active optical trail span of the incident photons can enhance the amount of absorbed photons in the active layer. Herein, this article reviews studies on the incorporation of noble metals and metal oxides nanostructures into bulk heterojunction polymer solar cells (BHJ PSCs) device architectures. In particular, we focus on presenting the latest progress in PSCs employing various fullerene electron acceptors with an emphasis on their performances, optical and structural properties upon integration of the mentioned nanostructure. We discuss the effect of metallic nanoparticles (NPs) integration, such as gold (Au) and silver (Ag), on the performance of PSCs according to theoretical interpretation. In addition to the metallic NPs, we discuss the influence of metal oxide nanoparticle incorporation, such as CuO, ZnO and TiO₂, on the performance of the organic based solar cells.