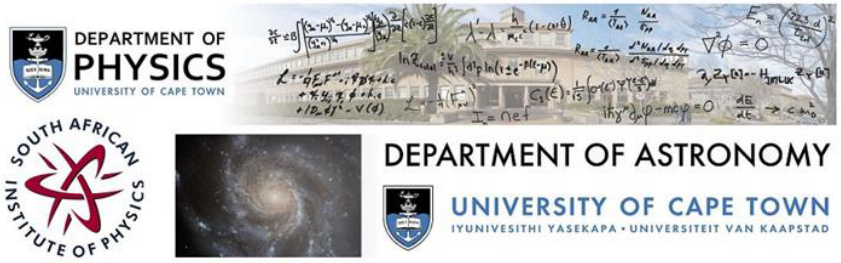

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Tuning the Energetic Driving Force of P3HT-ZnO heterostructures for Enhanced Electron Transfer in Organic PV solar cells

Wednesday, 6 July 2016 11:50 (20 minutes)

Abstract content
   (Max 300 words)
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In this report, we successfully investigated the photophyscial properties of a polymer hybrid based heterostructure for photovoltaic applications. Several analytical characterization techniques were used to probe the effect of the acceptor semiconductor in the P3HT polymer donor. The study revealed enhanced chain order with the inclusion of ZnO and ZnO:RE3+ nanostructures in the P3HT polymer matrix. In addition, the light absorption was dramatically harvested in the visible range of the electromagnetic spectrum as a result of nanostructured ZnO and ZnO:RE3+ inclusion. Moreover, reduced relaxation energy in the case of the heterostructure based ZnO was found to originate from the improved chain order and higher root-mean square surface roughness, relative to pristine P3HT thin film. Interestingly, the widening of the bandgap of ZnO:RE3+ as compared to ZnO resulted in enhanced energetic driving force which was found to be a critical parameter in determining the interface heterojunction quality and further the performance of the organic/inorganic hybrid heterostructures. Finally, time-correlated single photon counting (TCSPC) revealed higher electron transfer in the P3HT heterostructure based on ZnO:RE3+ as compared to nanostructured ZnO.

Keywords: energetic driving force, electron transfer, P3HT-ZnO:RE3+, Bandgap, TCSPC.

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