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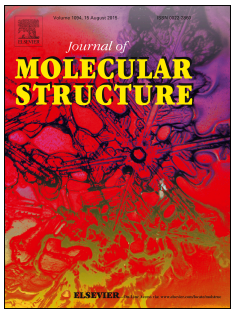

Hole transfer from CdSe nanoparticles to TQ1 polymer in hybrid solar cell device

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Hole Transfer from CdSe Nanoparticles to TQ1 Polymer in Hybrid Solar Cell Device

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Abstract

In view of realizing the economic viability, we fabricate a solar cell device containing low band gap and easily processable polymer 5-yl-8-(thiophene-2,5-diyl)-2,3-bis(3-(octyloxy)phenyl) quinoxaline (TQ1) and CdSe nanoparticles (NPs) and investigate its charge transport properties. When the TQ1 is combined with the CdSe NPs a strong photoluminescence quenching and shortening of photoluminescence lifetime of the TQ1 is observed indicating exciton transfer from TQ1 to the CdSe NPs. The time-resolved photoluminescence further reveals that the exciton transfer from the polymer to CdSe NPs is very efficient (68 %) and it occurs in < 1 ns. The exciton transfer from TQ1 to the NPs and electron-hole pair separation followed by hole transfer from the NPs to the TQ1 at the interface indeed increases the lifetime of the charge carriers. This in turn increases the efficiency of the solar cell as compared to polymer only device. These observations suggest