

HYBRID SOLAR CELLS BASED ON ZnO NANOWIRES DECORATED WITH CdTe QUANTUM DOTS

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We demonstrate a route to improve the efficiency of hybrid solar cells by employing a photosensitized, high-surface area electrode, which is achieved by growing ZnO nanowires on ITO electrode and decorating the nanowire surface with CdTe quantum dots. Employing the nanowires alone was already observed to increase the short-circuit photocurrent (I_{SC}) by 20 times under visible light illumination and this was further increased by a factor of ~ 1.5 due to the photosensitization effect of CdTe. This resulted to the enhancement in the efficiency by a factor of ~ 1.6 , which is attributed to the large organic-inorganic interface area where exciton dissociates as well as the broad optical absorption of CdTe of up to 820 nm.

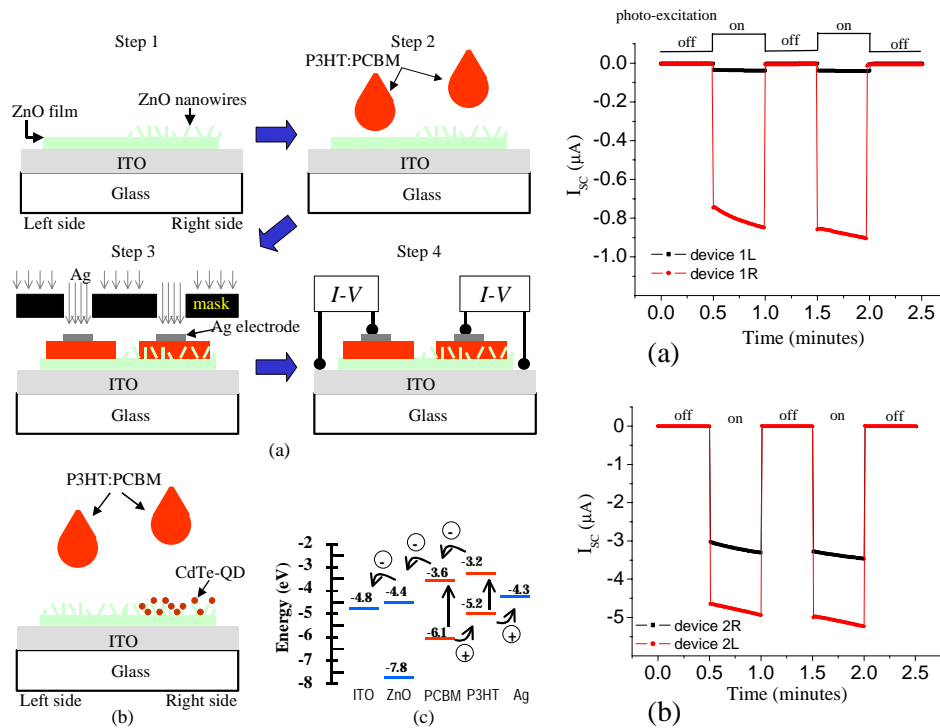


Figure 1. (a) Preparation of PV devices for studying the effect of ZnO nanowires. (b) Step 2 in the preparation of PV devices for studying the effect of CdTe quantum dots. (c) Energy level diagram of ITO/ZnO/P3HT:PCBM/Ag device.

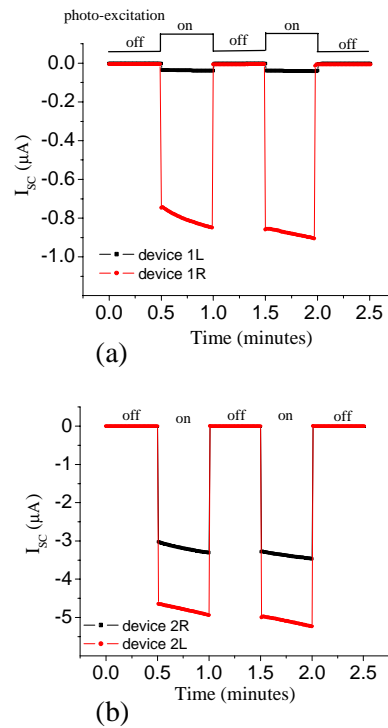


Figure 2. (a) Short circuit current (I_{SC}) of flat ZnO film (device 1L) and ZnO nanowire (device 1R). (b) I_{SC} of bare (2R) and photosensitized ZnO nanowires (2L).