

High Efficiency Dye-Sensitized Solar Cells based on the ZnO Nano-particle Aggregation Sphere

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We prepared ZnO nanoparticle aggregation sphere (NAS) which was prepared in a methanolic solution of zinc acetate dihydrate and composed of nanoparticles that connect with each other, thereby implying good electron transfer properties. The current (J_{sc}) -voltage (V) result for the ZnO NAS fabricated DSSCs revealed a current density (J_{sc}), open-circuit voltage (V_{oc}), fill factor (FF) and efficiency (η) of 8.163 mA/cm², 0.558 V, 50.2% and 2.29%, respectively. The incident photon to current efficiency spectra suggested that the higher energy conversion efficiencies was obtained from ZnO NAS, which extends the distance that light travels within the photoelectrode film. Therefore, ZnO NAS assembled from connected nanoparticles allows more efficient transport and collection of photogenerated electrons through a designed path, leading to the high efficiency solar cells.