

Synthesis of flower-like zinc oxide and polyaniline with worm-like morphology and their applications in hybrid solar cells

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ABSTRACT

ZnO with a “flower-like” morphology was synthesized using a simple microwave assisted hydrothermal method and used as an acceptor material in hybrid solar cells. X-Ray diffraction and Raman Spectroscopy confirmed the formation of a highly crystalline wurtzite ZnO structure. A highly crystalline and conductive polyaniline with “worm-like” morphology was synthesized by chemical polymerization of aniline using $\text{KH}(\text{IO}_3)_2$ as an oxidant and was used as a donor material for solar cells. The morphology was probed by using scanning and transmission electron microscopy. Polyaniline with worm-like morphology had a diameter of 160 nm and about 2 μm long. Solar cell device fabricated from PANI/ZnO active bilayer demonstrated a fill factor of about 22.8%. Upon blending PANI with ZnO the fill factor was improved to 25.6% and efficiency by almost 100 fold when PANI:ZnO 1:1 composite was used as an bulk heterogeneous active layer. The fill factor was further improved to 26.4% when device architecture was changed to diffused bilayer.