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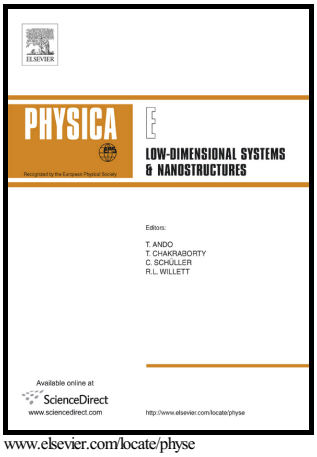

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40% efficiency enhancement in solar cells using ZnO nanorods as shell prepared via novel hydrothermal synthesis

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Abstract

Herein, rod-like ZnO nanostructures were synthesized via a novel hydrothermal route using $Zn(OAc)_2$, ethylenediamine and hydrazine as a new set of starting reagents. The as-synthesized products were characterized by techniques including XRD, EDS, SEM, and FTIR. The prepared ZnO nanostructures were utilized as shell on TiO_2 film in DSSCs. Effect of precursor type, morphology and thickness of ZnO shell (number of electrophoresis cycle) on solar cells efficiency were well studied. Our results showed that ethylenediamine has crucial effect on morphology of synthesized ZnO nanostructures and using ZnO nanostructures leads to an increase in DSSCs efficiency compared to bare TiO_2 from 4.66 to 7.13% (~40% improvement). Moreover, highest amount of solar cell efficiency (7.13%) was obtained by using ZnO nanorods with two cycle of electrophoresis for deposition.

Keywords:

Nanorods, Hydrothermal, ZnO, Solar energy materials, Ethylenediamine.