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One-step Synthesis of Mesoporous TiO_2 Film for High Photon-to-Electron Transport Efficiency in Dye-sensitized Solar Cells

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Abstract

The mesoporous TiO_2 film is prepared by one-step vapor-thermal process using the titanium precursor directly. Compared with the traditional annealing methods, the prepared vapor-thermal mesoporous TiO_2 films (VTMTF) reduce the resistance of interfaces effectively, possess more homogeneous pore distribution and own less nanoparticles agglomeration. Subsequently, the photoanodes based on VTMTF could significantly decrease the interfaces resistance of the TiO_2/dye/electrolyte. Owing to these, the dye-sensitized solar cells based on VTMTF showed an improved power conversion efficiency of 6.22%, compared with the traditional annealing porous TiO_2 (3.89%).

Keywords: mesoporous TiO_2 film; photon-to-electron transport efficiency; power conversion efficiency; dye-sensitized solar cells

Introduction

Dye-sensitized solar cells (DSSCs) have attracted intensive attention due to its merits of low-cost, facile fabrication, reasonable high power conversion efficiency (PCE),