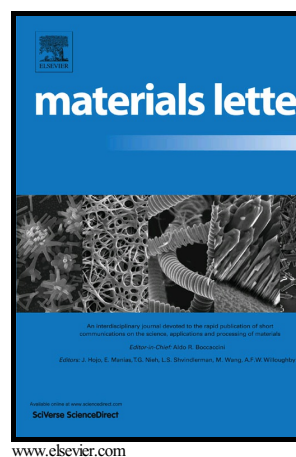


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Peizhi Yang, Qunwei Tang



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A nanoporous titanium dioxide framework for dye-sensitized solar cell

Peizhi Yang^{1*}, Qunwei Tang^{2*}

¹ Key Laboratory of Advanced Technique & Preparation for Renewable Energy Materials, Ministry of Education, Yunnan Normal University, Kunming 650500, China;

²Institute of Materials Science and Engineering, Ocean University of China, Qingdao 266100, China;

* E-mail address: pzhyang@hotmail.com; tangqunwei@ouc.edu.cn; Tel/Fax: 86 871 5517125.

Abstract: Dye-sensitized solar cell (DSSC) is a promising solution to energy depletion, environmental pollution, and ecological destruction. In this communication, we have successfully prepared nanoporous titanium dioxide (TiO₂) framework by etching traditional TiO₂ nanoparticle film for DSSC applications. Due to the enhancement in light-scattering and fast electron transport, a promising power conversion efficiency of 8.29% is recorded from the DSSC employing TiO₂ nanoframework in comparison with 6.24% for the solar cell with pristine TiO₂ anode.

Keywords: Energy storage and conversion; Solar energy materials; Structural

1. Introduction

Dye-sensitized solar cell (DSSC) [1] is a lower cost, simpler preparation process, relatively higher photoelectric conversion efficiency and lighter mass [2] than conventional solar cells, such as silicon-based solar cells. A typical DSSC device is composed of a mesoporous network of TiO₂ nanoparticles for uptaking dye photosensitizer, redox-active electrolyte containing iodide/triiodide (I⁻/I₃⁻) couples, and Pt counter electrode for converting I₃⁻ to I⁻. An ideal TiO₂ film should simultaneously meet several major requirements such as a large specific surface area for sufficient dye uptakes, a superior scattering effect for enhanced light-harvesting, a prominent electron transport and recombination characteristic for efficient charge-collection, as well as an adequate network and

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