

Accepted Manuscript

Controlled charge-dynamics in cobalt-doped TiO₂ nanowire photoanodes for enhanced photoelectrochemical water splitting

Changhai Liu, Fang Wang, Shishi Zhu, Yu Xu, Qian Liang, Zhidong Chen

PII: S0021-9797(18)30750-1
DOI: <https://doi.org/10.1016/j.jcis.2018.07.003>
Reference: YJCIS 23794

To appear in: *Journal of Colloid and Interface Science*

Received Date: 12 March 2018
Revised Date: 30 June 2018
Accepted Date: 2 July 2018

Please cite this article as: C. Liu, F. Wang, S. Zhu, Y. Xu, Q. Liang, Z. Chen, Controlled charge-dynamics in cobalt-doped TiO₂ nanowire photoanodes for enhanced photoelectrochemical water splitting, *Journal of Colloid and Interface Science* (2018), doi: <https://doi.org/10.1016/j.jcis.2018.07.003>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Controlled charge-dynamics in cobalt-doped TiO₂ nanowire photoanodes for enhanced photoelectrochemical water splitting

Changhai Liu^a, Fang Wang^a, Shishi Zhu^a, Yu Xu^a, Qian Liang^b, Zhidong Chen^{b,*}

^a*School of Materials Science & Engineering, Jiangsu Collaborative Innovation Center of Photovoltaic Science and Engineering, Changzhou University, Changzhou, Jiangsu 213164, P. R. China*

^b*School of Petrochemical Engineering, Changzhou University, Changzhou, Jiangsu 213164, PR China*

* Corresponding author. Tel.: +86 0519-86330232; Fax.: +86 0519-86330232. E-mail addresses: zdchen@cczu.edu.cn (Zhidong Chen)

ABSTRACT

In this study, we report for the first time the controlled Co-doping in TiO₂ nanowire (NW) arrays grown on the FTO substrate for highly efficient photoelectrochemical (PEC) water splitting. The Co/TiO₂ and pristine TiO₂ are single crystalline with a tetragonal rutile structure, while the primary peaks were transformed to (002) with the adding of Co. Compared to pristine TiO₂ NW photoanode, the photocurrent of as-prepared Co/TiO₂ NW arrays electrodes show a higher PEC activity with up to ~150% of photocurrent density increase under simulated solar radiation. The Co-doping enabled to control the charge dynamics in TiO₂ photoanode and thus can achieve an enhanced photocurrent density. The electrochemical impedance measurement indicates that the density of photogenerated carriers can be significantly increased by the Co doping. The Co/TiO₂ NW photoanodes exhibit high stability in photoelectrochemical conversion and show great potential for a variety of solar energy driven applications.

Keywords

TiO₂; Nanowires; Hydrothermal; Co-doping; Photoelectrochemical water splitting

1. Introduction

Hydrogen evolution from solar-driven water splitting provides an environmentally and sustainable strategy to face the global energy crisis, since the solar energy is one of the inexhaustible energy sources and hydrogen is storable, transportable and high capacity density. Well-known, one-dimensional (1D) nanostructured semiconductor photoanodes have been

Download English Version:

<https://daneshyari.com/en/article/6990065>

Download Persian Version:

<https://daneshyari.com/article/6990065>

[Daneshyari.com](https://daneshyari.com)