

## Accepted Manuscript

Titanium Dioxide Nanostructures for Photoelectrochemical Applications

Shaohua Shen, Jie Chen, Meng Wang, Xia Sheng, Xiangyan Chen, Xinjian Feng, Samuel S. Mao

PII: S0079-6425(18)30074-4  
DOI: <https://doi.org/10.1016/j.pmatsci.2018.07.006>  
Reference: JPMS 528

To appear in: *Progress in Materials Science*

Received Date: 13 October 2017  
Revised Date: 23 May 2018  
Accepted Date: 7 July 2018

Please cite this article as: Shen, S., Chen, J., Wang, M., Sheng, X., Chen, X., Feng, X., Mao, S.S., Titanium Dioxide Nanostructures for Photoelectrochemical Applications, *Progress in Materials Science* (2018), doi: <https://doi.org/10.1016/j.pmatsci.2018.07.006>

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.



# Titanium Dioxide Nanostructures for Photoelectrochemical Applications

Shaohua Shen<sup>1\*+</sup>, Jie Chen<sup>1+</sup>, Meng Wang<sup>1+</sup>, Xia Sheng<sup>2</sup>, Xiangyan Chen<sup>1</sup>, Xinjian Feng<sup>2\*</sup>,  
Samuel S. Mao<sup>3</sup>

1. International Research Center for Renewable Energy, State Key Laboratory of Multiphase Flow in Power Engineering, Xi'an Jiaotong University, Shaanxi 710049, China. Email: shshen\_xjtu@mail.xjtu.edu.cn
2. College of Chemistry, Chemical Engineering and Materials Science, Soochow University, Jiangsu 215123, China. Email: xjfeng@suda.edu.cn
3. Department of Mechanical Engineering, University of California at Berkeley, Berkeley, CA 94720, USA.

<sup>+</sup> These authors contribute equally.

**Abstract:** This review comprehensively summarized the progresses in the design and modification of titanium dioxide (TiO<sub>2</sub>) nanostructures as photoelectrode materials for photoelectrochemistry (PEC) applications, mainly in solar-fuel conversion. Various kinds of TiO<sub>2</sub> nanostructures including the nanoparticulate, one-dimensional (nanowires, nanorods, nanotubes), two-dimensional (nanobelt, nanoribbon, nanosheet), three-dimensional (meso/nanoporous, branched nanostructures, *etc.*), and the crystal-facet tailored TiO<sub>2</sub> nanostructures are surveyed and discussed. For each type of nanostructure, the commonly-used and effective modification strategies are reviewed followed with a deep discussion on the properties relevant to PEC performances. Moreover, the surface modification approaches (surface disordering, passivation and decoration) on TiO<sub>2</sub> nanostructures are highlighted for developing efficient TiO<sub>2</sub>-based PEC cells. This review will serve as a good resource or guideline for researchers who are currently focusing on TiO<sub>2</sub> materials as well as for those who are interested in versatile semiconductor-based PEC applications.

**Keywords:** TiO<sub>2</sub>, Nanostructures, Photoelectrochemical, Solar fuel conversion, Water splitting

Download English Version:

<https://daneshyari.com/en/article/8022930>

Download Persian Version:

<https://daneshyari.com/article/8022930>

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