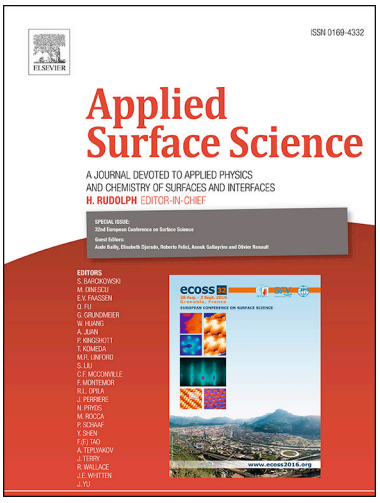
Accepted Manuscript



Full Length Article

Cu_2O-Tipped ZnO Nanorods with Enhanced Photoelectrochemical Performance for CO_2 Photoreduction

Muzaffar Iqbal, Yanjie Wang, Haifeng Hu, Meng He, Aamir Hassan Shah, Lin Lin, Pan Li, Kunjuan Shao, Abebe Reda Woldu, Tao He

PII: S0169-4332(18)30517-8
DOI: https://doi.org/10.1016/j.apsusc.2018.02.162
Reference: APSUSC 38620

To appear in: *Applied Surface Science*

Received Date: 14 November 2017
Revised Date: 10 February 2018
Accepted Date: 16 February 2018

Please cite this article as: M. Iqbal, Y. Wang, H. Hu, M. He, A. Hassan Shah, L. Lin, P. Li, K. Shao, A. Reda Woldu, T. He, Cu_2O-Tipped ZnO Nanorods with Enhanced Photoelectrochemical Performance for CO_2 Photoreduction, *Applied Surface Science* (2018), doi: https://doi.org/10.1016/j.apsusc.2018.02.162

Cu_2O-Tipped ZnO Nanorods with Enhanced Photoelectrochemical Performance for CO_2 Photoreduction

Muzaffar Iqbal,[a,b,§] *Yanjie Wang,*[a,b,§] *Haifeng Hu,*[a] *Meng He,*[a] *Aamir Hassan Shah,*[a,b] *Lin Lin,*[a] *Pan Li,*[a,b] *Kunjuan Shao,*[a] *Abebe Reda Woldu,*[a,b] *and Tao He*[*,a,b]

†CAS Key Laboratory of Nanosystem and Hierarchical Fabrication, CAS Center for Excellence in Nanoscience, National Center for Nanoscience and Technology, Beijing 100190, China.

‡University of Chinese Academy of Sciences, Beijing 100049, China.

§These authors contributed equally to this work.

* Corresponding author: Tao He, het@nanoctr.cn

Abstract

The design of Cu_2O-tipped ZnO nanorods is proposed here aiming at enhanced photoelectrochemical properties. The tip-selective deposition of Cu_2O is confirmed by scanning transmission electron microscopy (STEM). The photoinduced charge behavior like charge generation, separation and transport has been thoroughly studied by UV-vis absorption analysis and different photoelectrochemical characterizations, including transient photocurrent, incident photon-to-current efficiency (IPCE), electrochemical impedance spectroscopy (EIS), intensity-modulated photocurrent spectroscopy (IMPS), and Mott-Schottky measurements. The photoelectrochemical characterizations clearly indicate that ZnO/Cu_2O structures exhibit much higher performance than pristine ZnO, due to the formation of p-n junction, as well as the tip selective growth of Cu_2O on ZnO. Photocatalytic CO_2 reduction in aqueous solution