Short Communication

NiO Nano-Flower Sensitized by Perovskite as Photocathode for p-DSSC with Superior Hole Transfer Kinetics

Jie Qu¹,*; Yurong Ren¹; Jia Cheng²; Jianning Ding¹,*; Ningyi Yuan¹

¹School of Materials Science and Engineering, Jiangsu Collaborative Innovation Center of Photovoltaic Science and Engineering and Jiangsu Province Cultivation base for State Key Laboratory of Photovoltaic Science and Technology, Changzhou University, Changzhou 213164, P. R. China
²Hunan Hua Teng Pharmaceutical Co., Ltd, Changsha 410205, P. R. China
*E-mail: qujie1981@cczu.edu.cn; dingjn@cczu.edu.cn
doi: 10.20964/2016.09.61

Received: 24 June 2016 / Accepted: 19 July 2016 / Published: 7 August 2016

NiO nano-flower, NiO slice-cluster and NiO nanoparticles have been synthesized by a facile method. The structure and morphology of the prepared samples were characterized by X-ray diffraction (XRD) and transmission electron microscopy (TEM). The as prepared samples are used as photocathode of p-DSSC. Current-voltage (I-V) curve shows that NiO nano-flower owns the highest J_sc of 10 mA cm⁻² and its efficiency can reach up to 0.84%. The UV-vis diffused reflectance spectra indicate that NiO nano-flower shows strong light scattering and diffuse reflection to enhance light harvesting. Electrochemical impedance spectroscopy (EIS), intensity-modulated photocurrent spectroscopy (IMPS), and intensity-modulated voltage spectroscopy (IMVS) further demonstrate that NiO nano-flower provides fast hole transfer, long electron life time and improved charge collection efficiency with suppressed recombination.

Keywords: p-type dye sensitized solar cell; photocathode; NiO nano-flower; perovskite; hole transfer

© 2016 The Authors. Published by ESG (www.electrochemsci.org). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (http://creativecommons.org/licenses/by/4.0/).