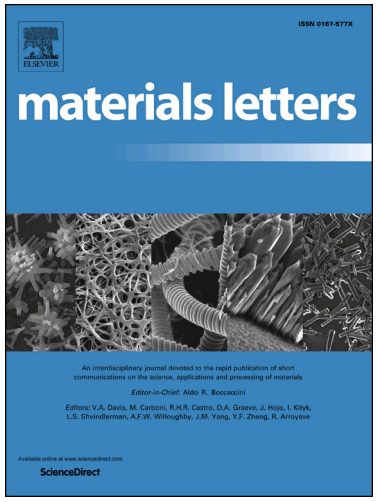

Role of copper and silver modified titania photoanode on performance engineering of dye sensitized solar cells

Ranjith G. Nair, Swapna Ojah, P. Mathan Kumar, S.K. Nikhil, S.K. Samdarshi

PII: S0167-577X(18)30522-6
DOI: https://doi.org/10.1016/j.matlet.2018.03.150
Reference: MLBLUE 24111

To appear in: *Materials Letters*

Received Date: 6 February 2018
Revised Date: 19 March 2018
Accepted Date: 23 March 2018

Please cite this article as: R.G. Nair, S. Ojah, P.M. Kumar, S.K. Nikhil, S.K. Samdarshi, Role of copper and silver modified titania photoanode on performance engineering of dye sensitized solar cells, *Materials Letters* (2018), doi: https://doi.org/10.1016/j.matlet.2018.03.150

Role of copper and silver modified titania photoanode on performance engineering of dye sensitized solar cells

Ranjith G Nair[a*], Swapna Ojah[b], Mathan Kumar P[a], Nikhil S.K[a] S. K. Samdarshi[c†]

[a]Solar Energy Materials Research & Testing Laboratory (SMaRT lab), Department of Physics, National Institute of Technology Silchar, Silchar, Assam-788010 (India)
[b]Department of Energy, Tezpur University, Tezpur, Assam-784028 (India)
[c]Centre for Energy Engineering and Centre of Excellence in Green and Efficient Energy Technology(CoE-GEET), Central University of Jharkhand, Ranchi 835205 (India)

Abstract

Effective charge carrier separation and charge transport at the interface layers of dye sensitized solar cells (DSSC) play a vital role in attaining superior photo conversion efficiency. The charge carrier separation and transport at the interfaces of DSSC can be improved by preparing suitable material interfaces based on the band edge offset. Present work reports the preparation of copper (Cu) and silver (Ag) modified titania as an efficient photoanode for DSSC. The structural analyses confirm the crystallinity of the samples in anatase phase with nanoscale crystallite size distribution. The optical analyses show an elevated absorption of the modified samples compared to the pristine titania. A prototype dye sensitized solar cell was fabricated using pristine and modified photoanodes, and the performance have been evaluated through I-V analysis with and without illumination. Cu and Ag modified titania photoanode showed 4.4 and 15 times enhanced photo conversion efficiency (PCE) respectively, compared to the pristine titania and this may be attributed to the effective charge separation and charge transport. The above result opens up a new area of research in modifying the photoanode of the next generation solar cells.

Keywords: Solar energy materials, Sol-gel preparation, Titania, Photoanode, Doping, Dye sensitized solar cells.

*rgnair2007@gmail.com
†drsksamdarshi@rediffmail.com