

Accepted Manuscript

Title: Comparison of chitosan and chitosan nanoparticles on the performance and charge recombination of water-based gel electrolyte in dye sensitized solar cells

Authors: Malihe Khalili, Mohammad Abedi, Hossein Salar Amoli, Seyed Ahmad Mozaffari



PII: S0144-8617(17)30838-X
DOI: <http://dx.doi.org/doi:10.1016/j.carbpol.2017.07.061>
Reference: CARP 12578

To appear in:

Received date: 13-4-2017
Revised date: 18-7-2017
Accepted date: 21-7-2017

Please cite this article as: {<http://dx.doi.org/>

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.

Comparison of chitosan and chitosan nanoparticles on the performance and charge recombination of water-based gel electrolyte in dye sensitized solar cells

Malihe Khalili, Mohammad Abedi*, Hossein Salar Amoli, Seyed Ahmad Mozaffari

Department of Chemical Technologies, Iranian Research Organization for Science and Technology (IROST), P. O. Box 33535-111, Tehran, Iran

*Corresponding author Tel: +982156276631; Fax: 982156276631.

E-mail address: mabedi50@yahoo.com

Address: Sh. Ehsani Rad St., Enqelab St., Ahmadabad Mostoufi Rd., Azadegan Highway, P. O. Box 3353-5111, Tehran, I. R. Iran

Abstract

In commercialization of liquid dye-sensitized solar cells (DSSCs), whose leakage, evaporation and toxicity of organic solvents are limiting factors, replacement of organic solvents with water-based gel electrolyte is recommended. This work reports on utilizing and comparison of chitosan and chitosan nanoparticle as different gelling agents in preparation of water-based gel electrolyte in fabrication of dye sensitized solar cells. All photovoltaic parameters such as open circuit voltage (V_{oc}), fill factor (FF), short circuit current density (J_{sc}) and conversion efficiency (η) were measured. For further characterization, electrochemical impedance spectroscopy (EIS) was used to study the charge transfer at Pt/electrolyte interface and charge recombination and electron transport at TiO_2 /dye/electrolyte interface. Significant improvements in conversion efficiency and short circuit current density of DSSCs fabricated by chitosan nanoparticle were observed that can be attributed to the higher mobility of I_3^- due to the lower viscosity and smaller size of chitosan nanoparticles.

Highlights

- Chitosan nanoparticles synthesized by ionic gelation and ultrasonication methods.
- The effect of chitosan size on performance of DSSC in water electrolyte investigated.
- Photovoltaic parameters of fabricated DSSCs measured and the results compared.

Keywords: Biopolymer; Chitosan nanoparticle; Water based electrolyte; Dye Sensitized Solar Cells; Electrochemical impedance spectroscopy.

1. Introduction

One of the most important issues that has obsessed present worldwide research is related to the future energy crisis, because of the growth of energy consumption and limited nonrenewable

Download English Version:

<https://daneshyari.com/en/article/5156588>

Download Persian Version:

<https://daneshyari.com/article/5156588>

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