

TiO₂-photoanodes from unconventional pastes for aqueous dye-sensitized solar cells

Original

TiO₂-photoanodes from unconventional pastes for aqueous dye-sensitized solar cells / Fagiolari, L.; Bonomo, M.; Cognetti, A.; Gerbaldi, C.; Barolo, C.; Bella, F.. - ELETTRONICO. - (2019), pp. 74-74. (Intervento presentato al convegno Merck Young Chemists' Symposium 2019 (MYCS 2019) tenutosi a Rimini (Italy) nel November 25th-27th, 2019).

Availability:

This version is available at: 11583/2809002 since: 2020-04-06T09:54:56Z

Publisher:

Società Chimica Italiana

Published

DOI:

Terms of use:

This article is made available under terms and conditions as specified in the corresponding bibliographic description in the repository

Publisher copyright

(Article begins on next page)



TiO₂-photoanodes from unconventional pastes for aqueous dye-sensitized solar cells

Lucia Fagiolari,^a Matteo Bonomo,^b Alessio Cognetti,^a Claudio Gerbaldi,^a
Claudia Barolo,^b and Federico Bella^a

^a Department of Applied Science and Technology (DISAT), Politecnico di Torino, Corso Duca degli Abruzzi 24, 10129-Torino, Italy

^b Department of Chemistry, Università degli Studi di Torino, Via Pietro Giuria 7, 10125-Torino, Italy

E-mail: lucia.fagiolari@polito.it

Within the photovoltaic field, dye-sensitized solar cells (DSSCs) have attracted much attention, due to their low cost, high transparency and possibility of diffuse light conversion, that permits their indoor application [1]. A key aspect to be considered is the stability of the devices, as well as the sustainability of materials and components. In this view, aqueous electrolytes are considered one of the possible breakthroughs toward large-scale diffusion of DSSCs, since they are non-toxic, safe and not affected by the contamination of air moisture [2]. Furthermore, the long-term stability could be increased by gelling the electrolyte solution into a solid polymeric matrix [3]. Consequently, the dye-sensitized TiO₂ photoanode should be wettable and allow the penetration in its bulk, but, at the same time, prevent the water-induced desorption of the dye molecules.

Herein, we report morphological modifications of TiO₂ photoanodes, introduced by adding various kinds of additives, both molecular and polymeric, to the commercial Dyesol TiO₂ paste, typically used for screen printing DSSC electrodes onto conductive glass. It was found out that the addition of polyethylene glycol (PEG) modified both the morphology and the thickness of photoanodes. As a result, PEG-based cells showed an increased short-circuit current density (+18%) and power conversion efficiency (48%) with respect to the pristine counterpart. For this reason, a deeper investigation and characterization of PEG-based electrode and cells were carried out.

[1] M. Freitag and G. Boschloo, *Curr. Opin. Electrochem.*, **2** (2017) 111-119.

[2] F. Bella, C. Gerbaldi, C. Barolo, and M. Grätzel, *Chem. Soc. Rev.* **44** (2015) 3431-3473.

[3] F. Bella, S. Galliano, M. Falco, G. Viscardi, C. Barolo, M. Grätzel, and C. Gerbaldi, *Green Chem.* **19** (2017) 1043-1051.