

AperTO - Archivio Istituzionale Open Access dell'Università di Torino

Aqueous Solar Cells: Novel Trends in Hybrid Devices

This is the author's manuscript

Original Citation:

Availability:

This version is available <http://hdl.handle.net/2318/1882102> since 2022-12-06T15:13:13Z

Terms of use:

Open Access

Anyone can freely access the full text of works made available as "Open Access". Works made available under a Creative Commons license can be used according to the terms and conditions of said license. Use of all other works requires consent of the right holder (author or publisher) if not exempted from copyright protection by the applicable law.

(Article begins on next page)

Aqueous Solar Cells: Novel Trends in Hybrid Devices

Federico Bella^a, Claudio Gerbaldi^a, Simone Galliano^b, Guido Viscardi^b, Claudia Barolo^b, Michael Grätzel^c

^a *Politecnico di Torino, Italy, Corso Duca Degli Abruzzi 24, Torino, 10129, Italy*

^b *Università degli Studi di Torino, Via P. Giuria 7, Torino, 10125, Italy*

^c *Ecole Polytechnique Federale de Lausanne (EPFL), Lausanne, Switzerland*

International Conference on Hybrid and Organic Photovoltaics (/hybrid-and-organic-photovoltaics-international-conference)

Proceedings of International Conference on Hybrid and Organic Photovoltaics (HOPV16)

Swansea, United Kingdom, 2016 June 29th - July 1st

Organizers: James Durrant, Henry Snaith and David Worsley

Oral, Federico Bella, presentation 138

Publication date: 28th March 2016

Dye sensitized solar cells (DSSCs) with high performances have been fabricated mainly with organic solvent-based liquid electrolytes. However, these solvents not only have high vapor pressure, but they are often toxic and flammable. In the last few years, the idea of moving towards a water-based or completely aqueous system clearly emerged [1].

DSSCs fabricated with aqueous electrolytes may offer reduced costs, non-flammability and environmental compatibility, but the presence of water in the cell may reduce the long term stability as well as the photovoltaic performance. For this reason, in recent years, an increasing number of research articles has been published in this direction and new dyes, electrodes and electrolyte components are continuously proposed [2].

In this work, the study of different truly aqueous electrolytes is presented and a chemometric approach, useful to investigate and optimize their efficiency and stability, is effectively demonstrated. A few curious and anomalous behaviors observed in the literature and in our laboratories are investigated for this class of electrolytes. Moreover the development of a series of novel aqueous gel electrolytes based on natural polymers is also discussed as well as their interesting photovoltaic characteristics.

[1] Xiang, W.; Huang, F.; Cheng, Y.-B.; Bach, U.; Spiccia, L. *Energy Environ. Sci.*, 2013, 6, 121.

[2] F. Bella, F.; Gerbaldi, C.; Barolo, C.; Grätzel, M. *Chem. Soc. Rev.* 2015, 44 (11), 3431.

© FUNDACIO DE LA COMUNITAT VALENCIANA SCITO



nanoGe is a prestigious brand of successful science conferences that are developed along the year in different areas of the world since 2009. Our worldwide conferences cover cutting-edge materials topics like perovskite solar cells, photovoltaics, optoelectronics, solar fuel conversion, surface science, catalysis and two-dimensional materials, among many others.

(/advanced-materials-2dimensions-quantum-dots-renewable-energy-conference)**nanoGe Fall Meeting (/advanced-materials-2dimensions-quantum-dots-renewable-energy-conference)**

nanoGe Fall Meeting (NFM) is a multiple symposia conference celebrated yearly and focused on a broad set of topics of advanced materials preparation, their fundamental properties, and their applications, in fields such as renewable energy, photovoltaics, lighting, semiconductor quantum dots, 2-D materials synthesis, charge carriers dynamics, microscopy and spectroscopy semiconductors fundamentals, etc.

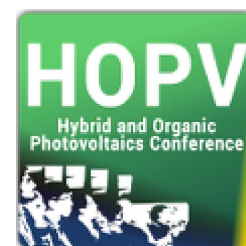
(/nanoge-spring-meeting)**nanoGe Spring Meeting (/nanoge-spring-meeting)**

This conference is a unique series of symposia focused on advanced materials preparation and fundamental properties and their applications, in fields such as renewable energy (photovoltaics, batteries), lighting, semiconductor quantum dots, 2-D materials synthesis and semiconductors fundamentals, bioimaging, etc.



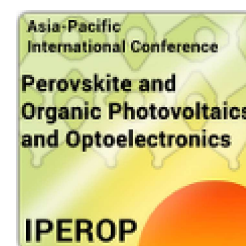
(/hybrid-and-organic-photovoltaics-international-conference)**International Conference on Hybrid and Organic Photovoltaics (/hybrid-and-organic-photovoltaics-international-conference)**

International Conference on Hybrid and Organic Photovoltaics (HOPV) is celebrated yearly in May. The main topics are the development, function and modeling of materials and devices for hybrid and organic solar cells. The field is now dominated by perovskite solar cells but also other hybrid technologies, as organic solar cells, quantum dot solar cells, and dye-sensitized solar cells and their integration into devices for photoelectrochemical solar fuel production.



(/international-perovskite-and-organic-photovoltaics-and-optoelectronics-conferenc)**Asia-Pacific International Conference on Perovskite, Organic Photovoltaics and Optoelectronics (/international-perovskite-and-organic-photovoltaics-and-optoelectronics-conferenc)**

The main topics of the Asia-Pacific International Conference on Perovskite, Organic Photovoltaics and Optoelectronics (IPEROP) are discussed every year in Asia-Pacific for gathering the recent advances in the fields of material preparation, modeling and fabrication of perovskite and hybrid and organic materials. Photovoltaic devices are analyzed from fundamental physics and materials properties to a broad set of applications. The conference also covers the developments of perovskite optoelectronics, including light-emitting diodes, lasers, optical devices, nanophotonics, nonlinear optical properties, colloidal nanostructures, photophysics and light-matter coupling.



(/perovskite-thin-film-photovoltaics-perovskite-photonics-and-optoelectronics)**International Conference on Perovskite Thin Film Photovoltaics Perovskite Photonics and Optoelectronics (/perovskite-thin-film-photovoltaics-perovskite-photonics-and-optoelectronics)**

The International Conference on Perovskite Thin Film Photovoltaics Perovskite Photonics and Optoelectronics (NIPHO) is the best place to hear the latest developments in perovskite solar cells as well as on recent advances in the fields of perovskite light-emitting diodes, lasers, optical devices, nanophotonics, nonlinear optical properties, colloidal nanostructures, photophysics and light-matter coupling.

