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Toward non-intrusive BIPV: strategies for NIR-selective DSSCs

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

Proceedings of International Conference on Hybrid and Organic Photovoltaics (HOPV22)

València, Spain, 2022 May 19th - 25th

Organizers: Pablo Docampo, Eva Unger and Elizabeth Gibson

Invited Speaker, Claudia Barolo, presentation 145

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Non-intrusive solar panels could represent the next frontier in the integration of photovoltaic technology in transparent windows (i.e. in residential buildings, automotive applications, greenhouses). Among the different possible approaches, Dye-sensitized Solar Cells offer a unique sustainable choice for transparent and even colorless windows, thanks to their wide versatility in the choice of dyes, electrolytes and redox couples as well as their ability to use diffuse light and work in low-light conditions.

The photosensitizer plays a crucial role in a non-intrusive wavelength-selective NIR-DSSC system. [1] Until now, different families of NIR chromophores have been investigated with relatively low success in terms of transparency and power conversion efficiency. Recently, thanks to the joint efforts of different research groups within the IMPRESSIVE project (<https://impressive-h2020.eu/>), we proposed a fully transparent and colorless DSSC that can display 3.1% power conversion efficiency, up to 76% average visible transmittance (AVT), while reaching a color rendering index (CRI) of 92. [2]

Starting from this result, innovative strategies should be applied (both to the synthetic approach and to the cell optimization) to outperform the obtained values and design stable and low-cost compatible materials able to be implemented in a real device.

References:

[1] Grifoni, F.; Bonomo, M.; Naim, W.; Barbero, N.; Alnasser, T.; Dzeba, I.; Giordano, M.; Tsaturyan, A.; Urbani, M.; Torres, T.; Barolo, C.; Sauvage, F. Toward Sustainable, Colorless, and Transparent Photovoltaics: State of the Art and Perspectives for the Development of Selective Near-Infrared Dye-Sensitized Solar Cells *Advanced Energy Materials* 2021 11 (43), 2101598 (<https://doi.org/10.1002/aenm.202101598>)

[2] Naim, W.; Novelli, V.; Nikolinakos, I.; Barbero, N.; Dzeba, I.; Grifoni, F.; Ren, Y.; Alnasser, T.; Velardo, A.; Borrelli, R.; Haacke, S.; Zakeeruddin, S.M.; Graetzel, M.; Barolo, C.; F. Sauvage Transparent and Colorless Dye-Sensitized Solar Cells Exceeding 75% Average Visible Transmittance *JACS Au* 2021, 1, 4, 409-426. (<https://doi.org/10.1021/jacsau.1c00045>)

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(/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.



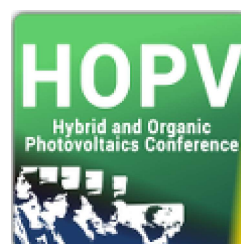
(/nanoge-spring-meeting)**nanoGe Spring Meeting (/nanoge-spring-meeting)**

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.



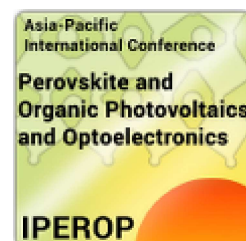
(/hybrid-and-organic-photovoltaics-international-conference)**International Conference on Hybrid and Organic Photovoltaics (/hybrid-and-organic-photovoltaics-international-conference)**

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)**