7-11 JULY 2024
NANOSMAT Barcelona
15th International Conference on Surfaces, Coatings and Nanostructured Materials
www.nanosmat2024.com

ABSTRACT:

Innovative Strategies in BIPV: Materials for Transparent Photovoltaics based on Wavelength Selective Solar Cells

S. Galliano1, N. Barbero1, B. Charrier1, M. Bokan1, K. Bondar1, D. Pasculli1, M. Rubes1, A.Y. Segura Zarate1, M. Bonomo1, R. Borrelli2, W. Naim3, F. Grifoni3, V. Challuri4, F. Barath4, F. Matteocci5, A. Di Carlo5, F. Sauvage3, C. Barolo1
1University of Torino, Dept. of Chemistry, NIS Interdept. and INSTM Reference Centre, Torino, Italy.
2University of Torino, Dept. of Agricultural, Forest and Food Sciences, Grugliasco (TO), Italy.
3Université Picardie Jules Verne, CNRS, LRCS, Amiens, France.
4G-LYTE SAS - Picardie, Amiens, France.
5 University of Rome Tor Vergata, Dept. of Electronics Engineering, CHOSE, Roma, Italy.

Transparent photovoltaics (TPV) is an emerging technology in which the solar cells selectively transmit the visible light, while harvest UV and/or NIR photons for electricity production.[1] TPV is particularly promising to deploy solar cells into new sectors like building integrated photovoltaics (BIPV). One possible approach to TPV is based on wavelength-selective absorbers where the dye requires an absorption far from the photopic response of human eye.[2] Among different classes of dyes, polymethines (cyanines and squaraines) are promising for their high molar extinction coefficient and easily tunable properties through facile and low-cost synthesis. In particular, cyanines have already been investigated for DSSCs with promising results, and fully transparent and colorless DSSCs were built reaching 80% transmittance.[3] Aiming to create a library of NIR dyes with improved performances, new series of cyanines and squaraines have been synthesized and characterized in terms of optical, photophysical and electrochemical properties, showing interesting structure/property relationships. Finally, photovoltaic performances have been evaluated in lab-scale DSSCs and optimized by different anode modifications and electrolyte formulations.

Acknowledgements: This research has received funding from EU's Horizon 2020 research and innovation program under Grant Agreement n°826013 (IMPRESSIVE) and from MASE through the Research Fund for the Italian Electrical System (type-A call, G.U.R.I. n. 192 on 18-08-2022) (CANVAS). This research acknowledges support from the

Project CH4.0 under the MUR program “Dipartimenti di Eccellenza 2023–2027” (CUPD13C22003520001).

[1] Traverse C.J. et al., Nat. Energy, 2, 849 (2017)
[2] Grifoni F. et al., Adv. Energy Mat., 11, 2101598 (2021)
[3] Naim W. et al., JACS Au, 1, 409 (2021)