

Electrolytes and organic dyes used in dye-sensitized solar cells: Local structure, Dynamics and photophysics

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Abstract

The presentation will cover two main components of the dye-sensitized solar cell (DSSC): the electrolytes structure and dynamics and the photophysics of dyes used in DSSCs. Indeed, the electrolyte locale structure composition of the electrolyte can influence the mobility and diffusivity of the ions in the electrolyte, which, in turn, affects the charge transport properties of the device. For instance, a high viscosity electrolyte may limit ion mobility and reduce the device's efficiency. While, the photophysics of the dyes used in dye-sensitized solar cells (DSSCs) (see Figure 1) can significantly impact the efficiency of the device. In the first part of my talk I will present our recent results on the study of the structure and dynamics of the mixture of ionic liquid/solvent mixtures that are used as electrolytes. These results were obtained using an array of experimental (vibration spectroscopy, NMR, Kerr effect ..) and theoretical approaches. In the second part, I will present our analysis of the mixture composition of these ionic liquids on the photophysics of organic dyes used in the solar cells.

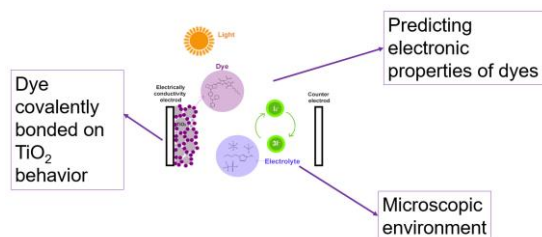


Figure : dye-sensitized solar cells (DSSCs)

Recent Publications

1. D. S. Stepaniuk, M. M. Blazhynska, V. Koverga, A. Kyrychenko, F. A. Miannay, A. Idrissi, *Mol. Simulation* 48 (2022) 97-103
2. K. Polok, M. Beisert, A. Świątek, N. Maity, P. Piatkowski, W. Gadomski, F. A. Miannay and A. Idrissi, *Phys. Chem. Chem. Phys.*, 2020, 22, 24544-24554
3. F. A. Miannay, J. Dubois, O. Kalugin, V. Koverga, Y. Smortsova, A. Idrissi, *J. Mol. Liq.*, 282 (2019) 39-50
4. M. M. Blazhynska, D. S. Stepaniuk, V. Koverga, A. Kyrychenko, A. Idrissi, O. N. Kalugin, *J. Mol. Liq.* 332(2021) 115811

Biography



Author has Abdenacer Idrissi received his M.Sc. in Physics from the University of Mohammed I (Oujda, Morocco), and his PhD in Physical Chemistry from the University of Lille (France), where he is a Professor of Chemistry and Physics at the present time. His research interest is focused on the understanding of the structure and dynamics of fluids including ionic liquids and supercritical fluids. The main problematics are the understanding of the cellulose dissolution, the control of the polymorphic forms of the bioactive molecules and the characterization of the short time dynamics of the dyes used in solar cells. These research are carried out using a combination of an array of spectroscopic technics (IR, Raman, neutron scattering, time resolved spectroscopy) with molecular dynamics simulation.

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