

Mass Spectrometry Analysis of Dye Sensitized Solar Cells

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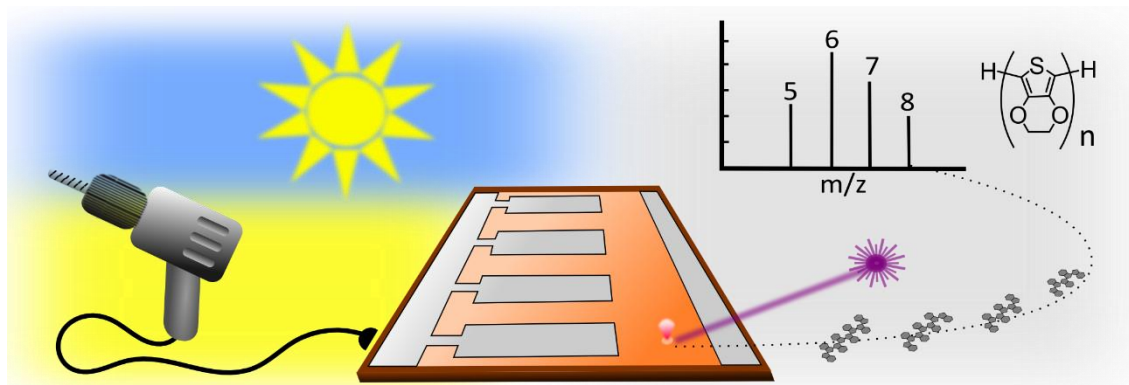
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Even though mass spectrometry (MS) has not been widely used in the field of dye sensitized solar cells (DSSCs), such methods as matrix-assisted laser desorption/ionization MS and liquid microextraction electrospray ionization MS are powerful tools for understanding molecular processes in DSSCs. A great advantage of the mentioned MS-based surface analytical techniques is that they allow examination of solar cells as they are without preliminary extraction of the analytes.

The following applications of MS will be covered in the talk:

- Degradation studies (revealing chemical reactions that cause the degradation).
- Maturation studies (some chemical reactions in DSSCs have positive effect on their performance).
- Dye-electrolyte interaction studies (revealing chemical reactions between the components) [1].
- Analysis of polymeric hole transport materials (M_w , M_n , end-groups) [2].

MS has made a revolution in life science (Fenn and Tanaka were awarded the Nobel prize "for their development of soft desorption ionization methods for MS analyses of biological macromolecules"), and it has potential to make a revolution in the field of solar energy.



[1] H. Ellis, V. Leandri, A. Hagfeldt, G. Boschloo, J. Bergquist, D. Shevchenko, *J. Mass Spectrom.*, Vol. 50, (2015), pp- 734-739.

[2] J. Zhang, H. Ellis, L. Yang, E. M. J. Johansson, G. Boschloo, N. Vlachopoulos, A. Hagfeldt, J. Bergquist, D. Shevchenko, *Anal. Chem.*, Vol. 87, (2015), pp-3942-3948.