Multivariate approaches making Dye-sensitized Solar Cells closer to industrial comprehension and optimization

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Modern science proposes and optimizes new materials and technologies, whose characteristics and performances are governed by many factors. However, the scientific community rarely adopts multivariate strategies for the comprehension of what is proposed. As a striking example, a standard dye-sensitized solar cell (DSSC) is a typical complex system assembled with different and heterogeneous layers, each one affected by intrinsic variability; moreover, the layers influence each other and this increases the number of variables involved at the same time in the photoconversion process.
To move closer to comprehension and optimization, as well as reproducibility and stability, of DSSC at an industrial level, we propose a chemometric design of experiments (DoE) approach for several case studies: the formulation of polymeric or cellulose-based electrolytes, the proper sensitization and photostability of photoanodes, and the investigation of aqueous solar cells relevant parameters.

References: Phys. Chem. Chem. Phys. 15 (2013) 3706; ChemSusChem 7 (2014) 3039; Electrochim. Acta 151 (2015) 306.

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