Application of Time Resolved Techniques in Photoelectrochemistry

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Transient Absorption Spectroscopy (TAS) in the optical range is a powerful tool to investigate the reaction dynamics of photogenerated species. These are key to the functioning of light responsive systems, among which photocatalysts, photoelectrodes and solar cells are of great importance for solar energy conversion [1],[2]. TAS possesses the unique ability to directly track the time evolution of the charge separated states created upon light excitation, by monitoring their spectroscopic signatures.
This lecture summarizes the basic principles of transient spectroscopy by considering the application of both ultrafast spectroscopy (fs-ns) and laser flash photolysis (ns-s) to the investigation of molecular species and materials relevant to photo-electrochemistry. We consider here the molecular sensitization of semiconductors, quantum dots, fundamental studies on interfacial electron transfer and the carrier dynamics of photoelectrodes whose surface was modified by "catalytic" charge transfer species to accelerate photoelectrochemical water oxidation.

References

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[2] M. Forster; D. W. F. Cheung; A. M. Gardner; A. J. Cowan *J. Chem. Phys.* **2020** 153, 150901