CH-426

Artificial photosynthesis

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Cursus	Sem.	Type
Chimiste	MA2	Opt.

Language of teaching	English
Credits	2
Session	Summer
Semester	Spring
Exam	Oral
Workload	60h
Weeks	14
Hours	**2 weekly**
Lecture	2 weekly
Number of positions	

Summary

This class is intended to make students familiar with dye sensitized solar cells. It presents the principle of design and rationalize the influence of various components on the power conversion efficiency of solar cells.

Content

Design and synthesis of efficient sensitizers for DSC and the influence of ligands on the energetics of sensitizers in tuning the spectral response.
Laser flash photolysis studies to understand the kinetic aspects of DSC, dye regeneration and recombination processes.
Solar conversion efficiency measurements and analysis of devices with electrochemical impedance spectroscopy.
Interface engineering by using co-adsorbing molecules to passivate the surface states. Influence of surface modification on the fermi level of titania and the photovoltaic performance of devices.
Various types of redox electrolytes will be discussed, emphasizing more on the iodide triiodide redox couple. The role of solvents on the performance of device and the use of solvent free ionic liquid electrolytes in DSC.

Learning Outcomes

By the end of the course, the student must be able to:

- Describe operating principle of dye solar cell
- Design photovoltaic sensitizer
- Compare different redox electrolytes
- Discuss effect of different parameters to enhance PV performance
- Optimize dye, electrolyte combinations
- Investigate influence of additives in electrolytes on device parameters

Teaching methods

Ex-cathedra class

Assessment methods

Oral examination

Resources

Notes/Handbook

Notes will be distributed