ChE-600

Solar photovoltaics and energy systems

Guijarro Carratala Nestor, Sivula Kevin, Tress Wolfgang Richard

Cursus	Sem.	Type
Chemistry and Chemical Engineering		Obl.
Energy		Obl.

Language of teaching	English
Credits	2
Session	
Exam	Multiple
Workload	60h
Hours	**41**
Courses	16
Exercises	25
Number of positions	

Frequency

Every 2 years

Remark

next time Spring 2020

Summary

Fundamental concepts of solar energy conversion from a thermodynamic perspective are discussed together with the state-of-the-art solar technologies. Students present and critique results from the latest literature.

Content

1. Solar irradiation as an energy source for electricity generation.
2. Thermodynamic efficiency restrictions in photochemical energy conversion.
3. Electronic and electrochemical materials for energy applications; relevant solid-state and physical concepts.
4. Structure of solar cells, p-n junctions, heterojunctions, Schottky junctions.
5. Organic materials in photochemistry.
6. Fundamentals of semiconductor photo-electrochemistry.
7. Dynamics of electron transfer and charge transport processes.
8. Bio-inspired molecular photovoltaics.
9. Dye-sensitization of wide bandgap materials.
10. Electrochemistry in energy conversion devices - overview.
11. Advanced strategies and materials for photochemical solar energy conversion

Hands-on experiments and demonstrations:

- Construction and testing of dye-sensitized solar cells.
- Electrochemical characterization of photovoltaic devices.
- Time-resolved laser spectroscopy (dynamics of competing electron transfer processes)

Learning Prerequisites

Recommended courses

Dipl-Ing or M.S., including physics, chemistry or materials science

Assessment methods

Oral exam and project report