ChE-430

Nanomaterials for chemical engineering application

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Cursus	Sem.	Type
Ing.-chim.	MA1, MA3	Opt.

Language of teaching	English
Credits	3
Session	Winter
Semester	Fall
Exam	Oral
Workload	90h
Weeks	14
Hours	**3 weekly**
Lecture	2 weekly
Practical work	1 weekly
Number of positions	

Summary

This course aims at understanding classical and non-classical nucleation theory, at reviewing different techniques for the synthesis of nanomaterials (mainly nanoparticles and thin films) and at learning about some key applications of these nanomaterials in chemical engineering

Content

Keywords

nanomaterials, classical nucleation theory, photovoltaics, light emitting diodes, solar fuels, electrocatalysis

Learning Outcomes

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

- Describe the differences between properties of bulk and properties of nanomaterials
- Discuss classical and non-classical nucleation theory
- Identify the most suitable synthesis technique to prepare the nanomaterial of choice
- Elaborate the benefits of nanomaterials in energy applications and catalysis.

Transversal skills

- Communicate effectively with professionals from other disciplines.
- Make an oral presentation.
- Collect data.
- Write a scientific or technical report.

Teaching methods

slides, videos, inverted classroom, laboratory at the end of the semester (at EPFL Valais in Sion)

Expected student activities

inverted classroom, 2 days in the laboratory (at EPFL Valais in Sion)
Note: We combine together the 14 practical work hours at the end of the semester so to have 2 full days in the laboratory where students will synthesize nanocrystals, characterize them and test them as electrocatalysts for CO2 reductlon

Assessment methods

Oral exam (60%), lab report (20%), Inverted classroom (20%)

Resources

Moodle Link

- https://go.epfl.ch/ChE-430