MSE-462 **Powder technology**

Bowen Paul

Cursus	Sem.	Type
Materials Science and Engineering	MA1, MA3	Opt.

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

Summary

Most materials e.g. ceramics, metals, polymers or concrete pass during their processing one or more steps in powders. This course discusses and presents the science & technology of important powder processing steps like compaction, dispersion, sintering and novel densification technologies.

Content

- Theoretical and empirical models for powder packing and compaction including disctete element modelling (DEM) (examples for ceramics and metals)
- Particle- particle interactions (colloidal chemistry, DLVO theory, non-DLVO forces , polymer adsorption, colloidal stability assessment). Examples from cement and concrete, landslides, ceramic powder granulation, paper coating.
- Introduction to atomistic modelling - with examples from grain boundary segregation of dopants in ceramics, polmyer adsorption and cyrstal growth
- Sintering mechanisms (metal, ceramics, influence of the microstructure, simulation)
- Novel technologies (includes rapid prototyping)
- The support material for the course are copies of the slides used to present the course along with a few key text books and review articles - which the students are encouraged to use to supplement the documents provided.

Keywords

powder technology, sintering, compaction, modelling, cement, ceramics, metals, colloidal dispersion

Learning Prerequisites

Recommended courses

Ceramics, Ceramic processing, material science

Important concepts to start the course

microstructure property relationships

Learning Outcomes

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

- Assess / Evaluate the use of different modelling methods in powder technology
- Model the stability of a colloidal dispersion
- Describe the different sintering methods used in powder technology
- Explain the limitations of classical DLVO theory
- Give an example in detail of the importance of powder characteristics in an everyday example of the application of powder technology
- Discuss powder compaction in detail

Teaching methods

lectures

Assessment methods

Oral exam

Supervision

Office hours	No
Assistants	No
Forum	No

Resources

Ressources en bibliothèque

- Powder Metallurgy Science / German

Notes/Handbook

see http://ltp.epfl.ch/page-35623-en.html chapter "Powder technology"

Websites

- http://ltp.epfl.ch/page-35623-en.html