



**University of Miskolc**  
**Faculty of Materials Science and Engineering**  
**Antal Kerpely PhD School on Materials Science**  
**and Engineering**



# Nanotechnologies

**Peter Baumli**  
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**COURSE DESCRIPTION**

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# Nanotechnologies

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## Target group of the course:

Suggested course, especially for students studying Interfacial Phenomena and Technologies.

## Language

English

## Goal of the course

The aim of this course to provide knowledge of the manufacturing technology, properties and application of various nanostructured materials.

## Methodology of the course

Part 1: classroom presentations, using all possibilities of in-situ internet.

Part 2: consultation with the students

Part 3: the students receive individual task (home work), which means to prepare a summary of literature study of a freely chosen nanoscience area.

## Subjects covered

1. Basics of Colloid Chemistry, characteristics of disperse systems
2. Liquid-liquid, liquid-solid, solid-gas and liquid-gas interfaces
3. Preparation of Nanosystems, coatings by vapour deposition
4. Production of Nanoparticles by chemical reduction methods
5. Preparation of nanoparticles by non-aqueous sol-gel technology
6. Production of special structure nanoparticles (core-shell, yolk-shell nanoparticles)
7. Synthesis of thin films
8. Synthesis of carbon nanofibers
9. Synthesis of metallic and metal oxide nanowires
10. Foams, porous materials
11. Development of Nanocomposites
12. Investigation of the nanodispersions

13. Industrial applications of the nanodisperse materials
14. Application of the nanodisperse systems in material engineering

## References

Brechignac, P. Houdy és M. Lahmani, Nanomaterials and Nanochemistry, Springer-Verlag, Berlin, Heidelberg, 2007.

## Requirements of course completion

Oral exam on the above list of subjects.

## List of questions for the complex exam

Synthesis methods of metal nanoparticles, compare the methods.

Synthesis of compound nanoparticle, how can be modified the morphology and the particle size.

The possibilities of the production of nanocomposites.

Preparation of the nanowire sensors, their applicability and „Principle of operation“.

Describe the possibilities of application of nanostructured materials in your own PhD research field.