

Course title: Functional nanomaterials – ~~selectable~~ / regular course

Number of contact hours: 30 hours (20h lectures, 10 h seminar)

ETCS credits: 2

Course description:

Functional nanomaterials are the basis of newly emerging nanotechnologies for various device applications. Nanomaterials with many kinds of morphologies and compositions have been extensively investigated, and display various kinds of functionality in areas such as electronic structure, optical effects, and gas sensing. This course aims to provide a comprehensive overview of synthesis and characterization of functional nanomaterials including nanoparticles, nanocomposites and hierarchical materials with nanoscale features, especially for optoelectronic. Course modules will cover the fundamental scientific principles controlling assembly of nanostructured materials; novel synthesis methods, measurement of the new properties at the nanoscale and emerging applications of nanomaterials. Emphasis is placed on understanding the design and properties of hierarchical nanostructures that are utilized in advanced applications, including photovoltaic applications, drug delivery, solar cell, LEDs and others. The course will also provide the students with necessary background for understanding basic nanomaterials characterization techniques. At the end the aspect of the toxicity of nanomaterials will be presented as well as the perspectives for further development will be discussed.

Education effects (P7S_UW, P7S_WG, P6S_UW, P6S_WG):

- **knowledge:**

- Students have a clear view the main the basic principles of nanotechnology and nanomaterials.
- Students are familiar with concepts of preparation and characterization techniques of functional nanomaterials for advanced applications.
- Students know in details the main synthesis methods of nanomaterials
- Students understand the particularity problems of toxicity of nanomaterials.
- Students know the main tools for characterization of functional nanomaterials.

- **skills:** student knows how to prepare high-quality presentation on selected topic

- **social:** student is able to work independently and in the group both at the seminar and during preparation of the presentation;

Literature: [1] Ludovico Cademartiri, Geoffrey A. Ozin, „ Concepts of Nanochemistry”

Assessment method: Final test, preparing the presentations at the seminar

Prerequisites: Basic knowledge in inorganic chemistry, organic chemistry and physical chemistry. Basic knowledge in analytical methods.

Primary target group: All specialties students

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