Courses in English

Course Description

Department 06 Applied Sciences and Mechatronics

Course title Micro- and Nanostructures

Hours per week (SWS) 4

Number of ECTS credits 6

Course objective After completing this module successfully students possess or have improved their competencies in the following fields:

- They know micro-and nanostructure fabrication processes and by discussing areas of application they can describe advantages and disadvantages;
- They have an improved understanding of semiconductor processes and tools and can draw them schematically;
- They know selected examples for micro-and nanostructures and -devices based on the mentioned processes, they can describe them physically and point out areas of application and the potential for further development;
- They have improved their physical understanding of solid state structures and devices with dimensions in the nanometer range; (They understand the interdisciplinary approach and comprehensive use of nanostructures and -devices.
- They can design a process flow for a given device, identify failures in thin film stacks, and develop improved processes.
- They have improved their technical English.

Prerequisites basics in semiconductor physics and electronics

Recommended reading
R. Waser, Nanoelectronics and Information Technology: Materials, Processes, Devices, Wiley-VCH.
Moodle course with video lectures.

Teaching methods seminaristic teaching

Assessment methods 100% written, 90min

Language of instruction English

Name of lecturer Schindler

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Course content Semiconductor physics

- Energy bands in semiconductors
- Devices
- MOS diodes
- MOSFETs
- New transistor concepts, e.g. cell-transistor coupling
- Example of use: logic, scaling, integrated circuits

Semiconductor technology

- Lithography
- Etching technology (focus on KOH and dry etching)
- Oxidation, diffusion, implantation
- Thin film deposition (physical and chemical vapor deposition, self-assembling monolayers)
- Printed electronics
- Example of use: memory technology
- Exercises to all discussed topics

Working on technical publications on the different topics and presentation in front of the class short presentations of up-to-date topics in the field of "micro-and nanostructures"

Remarks it is not clear, whether the course can be offered in winter 17/18
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