

SCIENTIFIC AND METHOD MODULES

Module name	Complex nanostructures - Transport in Heterostructures
Number	2008-M07
Aims	Deepen the understanding of nanostructures' physical properties and their relation to shape and geometry as well as energy transfer mechanisms. Properties of coupled nanosystems
Basics	Classical electrodynamics, basic condensed matter physics (band structure)
Contents	Functional nanostructures for advanced and novel applications. Fundamentals of charge carrier confinement, tunneling, electronic coupling of nanostructures, Coulomb blockade, introduction to spin related phenomena and magnetism, electronic transport in ferromagnetic nanostructures. Formation of self-assembled nanostructures, optical and electronic properties
Methods	Formation of contacts, dual beam microscope, magnetotransport, self-assembly during epitaxy (pulsed laser deposition), cathodoluminescence
Type	Two-day block course/ yearly recurrence with modification
Date (month/year)	1 October/ 7 October (attention: non consecutive days!)
Time	9.00 – 18.00
Work load	15 hours presence/ 45 hours self-study
Examination	oral/ written
Credit points	2
Responsible scientists	Esquinazi, Grundmann
International guest lecturers	Prof. Dr. N. Garcia (Consejo Superior de Investigaciones Científicas, Madrid), Dr. A. Rosenthal (FEI, Eindhoven), Prof. Dr. D. Chakarov (Chalmers University of Technology and Göteborg University), Prof. Dr. R. Cuerno (Universidad Carlos III de Madrid), Dr. Francesco Buatier de Mongeot (Università di Genova), Prof. Dr. E. Chason (Brown University)
Industrial partners	FEI Company
Recommendations for literature, e-learning	

SCHEDULE 2008

Time	Lecturer	Programme	Location
Day 1			
8:30	Prof. Dr. M. Grundmann, Univ. Leipzig	Confinement in nanostructures	Hörsaal f. theoretische Physik
9:15		<i>Coffee Break</i>	Aula
9:30	Prof. Dr. P. Esquinazi, Univ. Leipzig	Electronic Transport in Ferromagnetic Nanostructures	Th. HS
11:00		<i>Coffee Break</i>	Aula
11:15	Prof. Dr. N. Garcia,	Magnetoelectrical properties of	Th. HS

	Madrid	nanosystems: From single to multiple units	
12:00	Dr. A. Rosenthal, FEI	"What is a DualBeam? Overview of common applications"	Th. HS
13:00	<i>Lunch break</i>		
14:30	Esquinazi/Böhlmann	Lab course: Contacting a Co nanowire and magnetotransport measurement (max. 5 participants)	P 402
14:30	Grundmann/Lorenz Lenzner/Czekalla	Preparation of ZnO nanowires, imaging in scanning electron microscope, optical study using cathodoluminescence (max. 10 participants)	TA 307
Day 2			
8:30	Prof. Dr. Josef Breu, Universität Bayreuth	Colloids and Hybrids	Holiday Inn, 01099 Dresden, Stauffenbergallee 25a
9:15	Prof. Dr. Christoph Lienau, Universität Oldenburg	Ultrafast nano-optics: Surface plasmon polariton dynamics in metallic nanostructures and novel electron sources	Holiday Inn Dresden
10:00	<i>Coffee break</i>		
10:30	Prof. Dr. Franz-Josef Tegude, Universität Duisburg-Essen	III-V-Semiconductor nanowires for nanoelectronics	Holiday Inn Dresden
11:15	Prof. Dr. D. Chakarov, Chalmers University of Technology and Göteborg University	Laser manipulation of surfaces and nanostructures	Holiday Inn Dresden
12:00	<i>Lunch break</i>		
13:00	Sightseeing of the "Frauenkirche Dresden"		
15:15	Prof. Dr. R. Cuerno, Universidad Carlos III de Madrid	Continuum models of self-organized nanostructuring by low-energy ion beam erosion	Holiday Inn Dresden
16:00	Dr. Francesco Buatier de Mongeot, Università di Genova	Self-organized metal nanowire arrays with tunable optical anisotropy by low-energy ion beam erosion	Holiday Inn Dresden
16:45	<i>Coffee break</i> <i>Poster session</i>		
17:15	Prof. Dr. E. Chason, Brown University	Simulation and measurements of ion beam patterning in the linear instability regime	Holiday Inn Dresden
18:00	Prof. Dr. H. Fouckhardt, Universität Kaiserslautern	Glass and III/V surfaces with defined roughness by self-organization through maskless dry-etching	Holiday Inn Dresden