

SCIENTIFIC AND METHOD MODULES MARCH 2008

Module name	Nanomanipulations
Number	2008-M01
Aims	Introducing the building tools for controlled manipulation of nano-objects, macromolecules, proteins, and cells. A particular attention will be paid to basic working principles of the covered nanomanipulation techniques. This will enable the doctoral candidate to create new approaches to nanomanipulation.
Basics	(The topics are covered by biophysics lectures from existing master courses): Molecular and intermolecular forces, electrostatic forces, magnetic forces, optical forces, mechanical forces, ultrasound, micro- and nanostructures
Contents	<ol style="list-style-type: none"> 1. Electromagnetic forces: electric fields and dielectric materials, electrophoresis for molecules, proteins, and cells, magnetic forces. 2. Optical forces: gradient, scattering, and optical surface forces, Maxwell surface tensor, momentum transfer, transferring angular momentum, holographic tweezers, Mie- vs. Raleigh-regime. 3. Scanning force approaches: Van der Waals forces, inter- and intra-molecular interactions, detection with quadrant diodes. 4. Soft lithography.
Methods	Optical traps (optical tweezers, optical stretcher, optical cell guidance, optical spanners and rotators, optical sorting and deposition, laser dissection), magnetical tweezers, scanning force microscopy and spectroscopy, dielectrophoretic field cages, lab-on-a-chip.
Type	Two-day block course/ yearly recurrence with modification
Date	13.-14.3.2008
Time	9.00 – 18.00
Work load	15 hours presence/ 45 hours self-study
Examination	written
Credit points	2
Responsible scientists	Käs, Kremer, Robitzki
International guest lecturers	Dr. Christian Dittrich, Zeiss
Industrial partners	Zeiss
Recommendations for literature, e-learning	Will be provided within the module.

Place: seminar room 224, Linnestr.5

For further information please contact Prof. J. Käs directly!

Details Modul Nanomanipulations.

Die Veranstaltung soll im Raum 224 in der Linnéstr 5 stattfinden.

Schedule

Donnerstag, 13.3

9-10:30Uhr Einführung optische Nanomanipulation

10:30-12 Übersicht optische Nanomanipulation (Optical Stretcher, Optical Tweezer, Cell Guidance, Cell Rotator) im Käs Lab

12-14Uhr Mittagspause

14-14:45 Übersicht optische Nanomanipulation im Kremer Lab (**Vortrag bei Gustavo Dominguez**)

15:00-15:30 Optische Pinzette im Kremer Lab (**Führung bei Gustavo Dominguez**)

15:30-16:00 Optische Pinzette im Käs Lab (**Führung bei Brian Gentry**)

16:00-16:15 Cell Guidance im Käs Lab (**Führung bei Daniel Koch**)

16:30-17:00 Optische Nanomanipulation im Robitzki Lab (**Führung am BBZ durch Studenten von Frau Robitzki**)

Freitag, 14.3

9:00-10:00 Scanning Force Microscopy

10:00-11:00 SFM in the Käs Lab

11:00-12:00 **Vortrag Dr Christian Dietrich**, Zeiss, Optische Nanomanipulation bei Zeiss

12:00-14:00 Mittagspause

14:00-15:00 Optical Stretcher und Cell Rotator im Käs Lab (**Führung bei Karla Müller und Anatol Fritsch**)

15:00-15:30 SFM im Käs Lab (**Führung bei Claudia Brunner**)

15:30-16:30 Perspektiven in der Nanomanipulation, Ausgabe von Hausaufgabe (bis darauffolgenden Mittwoch)

Flankierend werden Kishan Dolaikin und Ernst-Ludwig Florin einen Vortrag in den nächsten Wochen geben!