

SCIENTIFIC AND METHOD MODULES

Module name	Basic Concepts in Molecular Spectroscopy
Number	2013-B4
Aims	This module for physicists, chemists and biochemists introduces the basic concepts in molecular spectroscopy, i.e. Infrared (IR), (surface enhanced) Raman- with imaging options and Broadband Dielectric Spectroscopy (BDS), Nuclear Magnetic Resonance Spectroscopy
Basics	The physical foundation of Infra-Red (IR) Spectroscopy and Broadband Dielectric Spectroscopy (BDS), Raman-, Surface Enhanced Raman-, Nuclear Magnetic Resonance (NMR) in the solid state, Light Scattering and surface sensitive spectroscopies with imaging options (Nanoscopy) will be presented in detail and some of its modern applications will be discussed. Additionally lab courses will be organized with demonstration experiments.
Contents	The quantum mechanical foundation of Infrared Spectroscopy; Experimental principles of Fourier Transform Infrared Spectroscopy; the principle of Broadband Dielectric Spectroscopy; modern Applications of Broadband Dielectric Spectroscopy; discussion of the chemical shift Hamiltonian with isotropic and anisotropic parts in NMR spectroscopy, the influence of sample orientation and molecular dynamics on the NMR signals, magic angle spinning
Methods	Seminars
Type	Two-day block course
Date (month/year)	April 18-19, 2013
Time	8:30 a.m.
Work load	15 hours presence/45 hours self-study
Examination	Written examination
Credit points	2
Responsible scientists	B. Abel, D. Huster, F. Kremer
Industrial partners	-
Recommendations for literature, e-learning	C. E. Housecroft, E. C. Constable: "Chemistry", Pearson; P. W. Atkins: "Physical Chemistry"; Haken, H.; Wolf, H.C. "Molecular Physics and Elements of Quantum Chemistry: Introduction to Experiments and Theory" (Series: Advanced Texts in Physics) (englisch) Springer, Berlin, 2004, K. Schmidt-Rohr & H. W. Spiess: "Multidimensional Solid-State NMR and Polymers" Academic Press, San Diego, 1994, F. Kremer & A. Schönhals: "Broadband Dielectric Spectroscopy" Springer, Berlin, 2003

SCHEDULE for Module 2013-B4

Time	Lecturer	Programme	Location
Thursday, 18.4.2013			
8:30-10:00	Daniel Huster	Static solid-state NMR line shapes	Härtelstr. 16-18 Raum 017
		<i>Coffee break</i>	
10:15-11:45	Daniel Huster	Achieving High Resolution in Solids	Härtelstr. 16-18 Raum 017
11:45-12:30	Daniel Huster	Labtour and demonstration experiments	Härtelstr. 16-18
		<i>Lunch break</i>	
13:30-15:00	Friedrich Kremer	Fourier Transform InfraRed Spectroscopy	Linnéstraße 5, Aula
		<i>Coffee break</i>	
15:15-16:45	Friedrich Kremer	Broadband Dielectric Spectroscopy	Linnéstraße 5, Aula
16:45-17:30	Friedrich Kremer	Labtour and demonstration experiments	Linnéstraße 5
Friday, 19.4.2013			
8:30-10:00	Bernd Abel	(surface enhanced) Raman spectroscopy	Linnéstraße 5, Aula
		<i>Coffee break</i>	
10:15-11:45	Bernd Abel	Nanoscopy	Linnéstraße 5, Aula
11:45-12:30	Friedrich Kremer	Written examination	

Didactic elements:

Lecture, discussions, practical training – lab demonstration, etc.

Expected performance:

Active participation in discussions during lab demonstration etc.