

Course name	Laboratory Thin layer systems and nano structures			
In Semester no.	6 or 7 of the CIB degree program			
ETCS-Credits	4			
Working hours	Total 120	Contact 60	Self-study 45	Exam preparation 15
Flag	compulsory optional subject (Wahlpflichtfach)			
Language	German or English			
Frequency	1 time per year			
Appropriate for other degree programs	No			
Prerequisite	Module general Chemistry, inorganic chemistry, safety at work and environmental law, physical chemistry			
Objective	Methods for the preparation of films with thicknesses in the range of some nanometers and some micrometers as well as the manipulation of their properties and their functional characterization. Methods for the preparation and characterization of nano-scaled particles and surfaces.			
Content (theory and experiment)	<p>Usually there will be a selection of 5 to 6 approved or novel experiments per course. The following schedule presents examples of approved experiments.</p> <ul style="list-style-type: none"> • Zeta-potential and pzc of titanium dioxide • Organic monolayers - silanization and thiolization of surfaces • Adsorption of amphiphilic macro molecules on hydrophobic and hydrophilic glass surfaces • Sol-gel process and dip coating • Photo activity of nanoporous TiO₂-layers • Hydrophobic functionalization of a cotton-based textile fabric • Synthesis of gold nanoparticles • Ultra hydrophobic surfaces – Lotus effect 			
Literature	Special scientific publications, Experiment descriptions (in English), Lagaly, Schulz, Ziemehl: Dispersionen und Emulsionen, Lehrbücher der Physikalischen Chemie			
Module responsible	S. Appel			

Teilgebiete und Leistungsnachweise

Type of instruction or learning	Hours per week	Learning and qualification targets	Assessment	Estimated student workload / h
Theoretical preparation Performance of Laboratory experiments Analysis of measurement results Recapitulation	4	-Knowledge about different methods suitable for the preparation of thin layers and films, -Knowledge about the properties of these films and layers as well as about the possibilities to adjust these properties. -Knowledge about the methods to measure these properties, -Knowledge about different methods for the preparation of nanoparticles and about their properties and applications -Knowledge of electrokinetical measurement methods -Ability to prepare and characterize monomolecular silane coatings, -Ability to prepare thin films for the functionalization of surfaces, -Ability to prepare thin layers through a sol-gel-process and determine their thickness, -Ability to prepare nanoporous films by means of screen printing and to characterize their photo catalytic activity	Written elaboration, one for each experiment Oral presentation, 20 min Oral examination, 30 min	120