che411 - Physical Chemistry of Surfaces and Interfaces

Module label
Physical Chemistry of Surfaces and Interfaces

Module code
che411

Credit points
9.0 KP

Workload
270 h

Used in course of study
- Master's Programme Chemistry > Mastermodule

Contact person
- Gunther Wittstock
- Katharina Al-Shamery

Module responsibility

Authorized examiners
- Katharina Al-Shamery
- Gunther Wittstock

Module counseling
- Mehtap Özaslan
- Carsten Dosche
- Izabella Brand
- Katharina Al-Shamery
- Gunther Wittstock

Entry requirements

Skills to be acquired in this module
Students familiarize themselves with complex research-related general concepts of interfacial and surface chemistry, their application in specialized experimental techniques as well as selected examples of their technical application with an emphasis on nanoscale systems.

Module contents

Master of Science
On the basis of the general knowledge from the BSc. course (chemical thermodynamics, chemical kinetics, electrochemistry, basics of spectroscopy), students select 3 advanced lectures from the catalogue of physical chemistry. According to the research focus on interfacial chemistry, this subject should be represented by a minimum of 2 lectures.

PhD program Interface Science
Students select 1 to 3 lectures (3 KP each) according to interest and need and attend a colloquium (30 min pass/fail) at the end of the semester. PhD students can only select lectures that have not been part of their MSc. curriculum.

These lectures are:
- Lecture - Structure of Interfaces and their Characterization, WiSe, freitags 8:30-10:00 Uhr (Wittstock/AlShamery)
  Thermodynamics of interfaces and adsorption, surface tension, contact angle, wetting, control of wetting, excess quantities, adsorption isotherms, charges at interfaces, transport phenomena at interfaces, colloids, control of interfacial properties in technical processes, interfaces in the environment.
  atomic structure of surfaces (two-dimensional lattices, relaxation, reconstruction, notation of surfaces), vibration at surfaces, electronic structure of surfaces
  Experimental methods: LEED (principles of diffraction, reciprocal lattices, Brillouin zones), scanning probe techniques (real lattices, tunneling process, STM, AFM) Photoelectron spectroscopy (UPS, XPS), vibrational spectroscopy at surfaces

- Lecture - Solid-gas interfaces in theory and application, SoSe, montags 12:15-13:45 Uhr (Al-Shamery)
  Advanced treatment of solid-gas interfaces with emphasis on low-dimensional systems
  optical and electronic properties of low dimensional systems
  adsorption and microkinetics at nanostructured materials
  nanostructured materials in heterogeneous catalysis: modern concepts from the perspective of surface science
  nanostructured materials and their application in nanooptics

- Lecture - Integrated Chemical Systems, SoSe, dienstags 10:15-11:45 Uhr (Wittstock)
  Theory: concept of integrated molecular functional systems, analogies and differences between existing biological and technical systems
  Präparation: Self-assembly processes, polymer films, conducting polymers, biomimetic systems, aspects of miniaturisation and patterning
  Charackterisation: Advanced electrochemical characterisation methods, Microelectrochemistry
  Semiconductor electrochemistry
Reader’s advisory

Links

Language of instruction: English

Duration (semesters): 3 Semester

Module frequency: jährlich

Module capacity: unlimited

Modul level: MM (Mastermodul)

Modulart: Wahlpflicht

Lern-/Lehrform / Type of program

Vorkenntnisse / Previous knowledge

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<tr>
<th>Examination</th>
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<td>Exercises</td>
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Total time of attendance for the module: 126 h