

Level: Bachelor
Course title: Basics of Physical Chemistry of Surfaces
Status: elective
ECTS: 6
Requirements: none
<p>Course aim</p> <p>Introduction to processes at the phase boundaries, with special emphasis on the solid/liquid interface. Student will gain fundamental knowledge about thermodynamic analysis of surfaces and basic experimental skills for characterisation of surface processes which are important for understanding numerous environmental and adsorption-catalytic processes.</p>
<p>Course outcome</p> <p>After the successful completion of the course, the student is able to: understand the processes at the surfaces and interfaces; understands modern thermodynamic interpretations of various surface phenomena; apply different instrumental, especially spectroscopic methods in explaining surface phenomena; conduct equilibrium and kinetic experiments in the characterization of solid surfaces.</p>
<p>Course content</p> <p><i>Theory</i></p> <p>The liquid / gas interface. Surface tension of liquids and solutions. Surface tension of surfactant solutions. Experimental methods of surface tension measurements. Surface tension and surface free energy. Gibbs adsorption isotherms. Surface films. Adsorption of gases and vapors on solids. The solid-liquid interface – adsorption from solution. Capillary phenomena. Physical and chemical adsorption. Enthalpy of adsorption. Equilibrium and kinetics of adsorption process. Adsorption isotherms. Methods of solid surface characterization. Ion exchange.</p> <p><i>Practice: Practical classes, OFT, SRW</i></p> <p>Determination of the surface tension of liquids. Determination of the surface tension of water in the presence of a surfactant. Gibbs adsorption isotherm. Determination of the kinetics of adsorption process and modeling. Determination of adsorption isotherms and modeling. Calculation exercises from the major topics in the curriculum.</p>
<p>Literature</p> <ol style="list-style-type: none"> 1. Worch, E., Adsorption technology in water treatment, Walter de Gruyter GmbH & Co. KG, Berlin, 2012. 2. Schwarzenbach, R.P., Gschwend, P.M., Imboden, D.M.: Environmental Organic Chemistry – Second Edition, Wiley, 2003.