



Gastvortrag

"Power of porous plasmonic materials for energy transfer in catalysis and sensing"

Dr. Olga Guselnikova (TU Wien)

Wann: 27.01.2026, 14-15:30 Uhr

Wo: Seminarraum 2, 1. Stock, Währinger Straße 42

Host: Univ.-Prof. Dr. Freddy Kleitz

Abstract

Surface plasmon resonance (SPR) on nanoparticles, excited by light, effectively transfers energy to organic molecules. Surface plasmons (SPs) are collective oscillations of valence electrons, triggered when the incident electromagnetic (EM) field matches the electrons' natural frequency. These plasmon-molecule interactions can (i) enhance surface chemical reactions (plasmon catalysis) and (ii) amplify analytical signals in surface-enhanced Raman spectroscopy (SERS). SPs create enhanced EM fields, boosting the Raman scattering of nearby molecules. In plasmonic chemistry, EM fields can decay radiatively, exciting molecules, or non-radiatively, generating hot carriers or increasing local temperature. Porous plasmonic materials generates highly contorted metallic curvatures that support volumetric electromagnetic hot spots and provides broad, tunable optical responses across the visible–NIR range. At the same time, porosity markedly increases accessible surface area and creates pathways for mass and heat transport, allowing reactants and analytes to access plasmon-active regions throughout the material interior rather than only at external surfaces. As a result, porous plasmonic materials exhibit a higher density of light–matter interaction events and improved performance in applications such as plasmon-driven catalysis and SERS sensing compared with nonporous plasmonic structures. This talk will explain the main advantages of porous plasmonic materials for catalysis and biosensing using specific examples from works of Dr. Guselnikova.

Bio

Dr. Olga Guselnikova is a Group leader at Centre of Electrochemical and Surface Technology and recently joined Technical University of Vienna to start her own group. She received her Ph.D. degree in chemistry from the University of Chemistry and Technology Prague (Czech Republic) and Tomsk Polytechnic University (Russia) in 2019. Her research interests are related to light-active materials for optical sensing (surface enhanced Raman spectroscopy) and organic catalysis with a focus to plasmonic materials. Recently, Dr. Guselnikova started to apply her expertise in light-active materials for (micro)plastic contamination issues.