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# PHOTONIK SEMINAR

**Dr. Florian Lackner**

Technische Universität Graz

## Photoemission Electron Microscopy of Plasmonic Nanostructures

This presentation will describe recent results from our NanoESCA laboratory, equipped with an energy-filtered photoemission electron microscope (EF-PEEM).

Plasmonic structures allow for the control of electromagnetic fields at the nanoscale. Our current efforts are geared towards time-resolved experiments on micron-sized gold structures. The employed EF-PEEM approach allows to track propagating surface plasmons in real space, with femtosecond temporal resolution. Local field-enhancement effects are of particular interest, which are observed, for example, at the apex of triangular shaped structures.

The combination of plasmonic metals with semiconductors represents an interesting material class, which holds promise for the development of photocatalytic and photovoltaic devices with enhanced efficiency. In a recent series of experiments core@shell Ag@ZnO nanoparticles have been studied employing EF-PEEM. Of particular interest are plasmon enhancement effects, which are investigated by two-photon photoemission (2PPE) spectroscopy.

Beyond 2PPE spectroscopy in the NanoESCA, high-order harmonic generation (HHG) based XUV sources are employed to study deposited CoO and NiO nanoparticles. First results indicate that ultrafast dynamics in nanoparticles can be traced with XUV transient absorption spectroscopy. Thus, the presented approach may be used to explore plasmon induced charge carrier dynamics with unprecedented temporal resolution.

**Thursday, 7<sup>th</sup> July 2022, 16:00 Uhr**

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