

Sonderseminar/Special Seminar
MPQ/LMU

Date: Friday, November 11, 2016

Time: 11 a.m., s.t.

Presentation: Divya Virmani
Universität Stuttgart/Universität Stuttgart &
Max-Planck-Institut für Festkörperforschung/
Max Planck Institute for Solid State Research

Title: Near Field Optical Mapping of Surface
Plasmon Polaritons on Single Crystalline Gold Platelets

Location: Chair Professor Theodor W. Hänsch
LMU, Faculty of Physics
Discussion Room H 311
Schellingstr. 4/IIIrd floor
D-80799 München/Munich

Division of Laserspectroscopy, Director Professor Theodor W. Hänsch

ABSTRACT

The possibility to directly investigate and manipulate highly localized fields of surface plasmon polaritons (SPPs) forms the backbone for a vast field of applications for e.g. in sensing and optoelectronics. Single crystalline gold nanoplatelets are ideal structures for supporting SPP propagation. In this project, we studied the field distributions associated with the SPPs excited on single crystalline platelets by employing a scattering type near field optical microscope (s-SNOM).

SNOM is a versatile technique, which enables the mapping of SPPs by studying the localized dielectric response of a sample generated by the interaction between light confined at a tip and the sample with subwavelength resolution.

Plasmonic lens structures consisting of periodic grating structures provide a convenient method to direct and focus the SPP waves. A circular grating structure with a period tuned to the SPP wavelength was employed to focus the SPPs to subwavelength spot sizes. Confined SPP fields on such small scales can be exploited in many fields such as surface enhanced Raman spectroscopy (SEERS) and photonic based devices.

We show the realization of subwavelength SPP focusing via plasmonic lens structures along with the excitation energy dependence of the SPP wavevectors. The SPP wavevectors matched well with theoretical predictions.