

## Spectroscopic Photoemission and Low Energy Electron Microscope (SPELEEM) at MAX-Lab

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We describe a SPELEEM microscope (Elmitec, GmbH) which will be initially installed as a second experimental station at a high resolution, undulator based soft X-ray beamline (BLI311) [1] working in the photon energy range of 30–1500eV at the MAX II synchrotron radiation source (E=1.5GeV). The general design of the beamline is based on a horizontally focusing premirror, an SX-700 type of plane-grating monochromator and Kirkpatrick-Baez refocusing optics. The beamline is equipped with an experimental station consisting of separate analyzer and preparation chambers. The photoelectron microscope will be installed after the existing experimental chamber and the photon beam will be refocused with two (vertical and horizontal) refocusing mirrors. The output flux from the monochromator is  $10^{11}$  -  $10^{13}$  ph/sec depending on the photon energy used and beamline settings. The flux will be delivered to the  $100 \times 100 \mu\text{m}^2$  spot size on the sample through the beam separator and the objective lens of the microscope at *normal incidence*. Two main advantages of having normal incidence illumination as compared to grazing incidence are the absence of shadowing effects for samples with surface topography and more even beam spot on the surface (grazing incidence stretches the light spot in the horizontal direction by a factor of 4 at a  $15^\circ$  incidence angle). The preparation chamber for the photoelectron microscope is designed to house a sample manipulator with e-beam heating, ion sputtering gun as well as LEED optics and Auger Electron Spectrometer (AES) for sample characterization. We aim to reach the spatial resolution  $\sim 30\text{nm}$  in photoemission mode of operation and  $\sim 10\text{nm}$  in the LEEM mode. The possible application examples - spectroscopy of single quantum dots and nanowhiskers, phase separation in strongly correlated systems, magnetic structures, phase transformations in overlayers etc. will be presented.

1. R.Nyholm, J.N.Andersen, U.Johansson, B.N.Jensen, I.Lindau Nuclear Instruments and Methods in Physics Research **A467-468**, 520 (2001).