

SMART: spectro-microscopy with aberration correction for many relevant techniques

Thomas Schmidt¹, Helder Marchetto², Ullrich Groh¹, Pierre L. Lévesque², Florian C. Maier¹, Tomáš Skála², Helmut Kühlenbeck², Peter Hartel⁵, Rainer Spehr⁵, Dirk Preikszas^{4,5}, Gerhard Lilienkamp⁶, Ernst Bauer⁶, Rainer Fink³, Harald Rose⁵, Hans-Joachim Freund², Eberhard Umbach¹

¹ *Experimentelle Physik II, University Wuerzburg,
Am Hubland, D-97074 Wuerzburg, Germany*

² *Fritz-Haber-Institut der Max-Planck-Gesellschaft,
Faradayweg 4-6, D-14195 Berlin, Germany*

³ *Physikalische Chemie II, University Erlangen-Nuernberg,
Egerlandstraße 3, D-91058 Erlangen, Germany*

⁴ *Carl Zeiss NTS GmbH, Carl-Zeiss-Strasse 56, D-73447 Oberkochen, Germany*

⁵ *Angewandte Physik, Technical University Darmstadt,
Hochstuhlstrasse 6, D-64289 Darmstadt, Germany*

⁶ *Physikalisches Institut, Technical University Clausthal,
Leibnizstrasse 4, D-38678 Clausthal-Zellerfeld, Germany*

The lateral resolution in photoelectron emission microscopy (PEEM) is basically limited by aberrations, which can only be overcome by suitable correction techniques. Operating in the final version since October 2004 the SMART (Spectro-Microscope with Aberration-correction for many Relevant Techniques) [1] is the first electron microscope which uses an electrostatic tetrode mirror combined with a highly symmetric magnetic beam-splitter [2] to compensate simultaneously for both, the chromatic and spherical aberrations. SMART aims at a lateral resolution below 2 nm with an energy resolution of 100 meV and is therefore the most ambitious project in the field of spectroscopic microscopy worldwide. In addition to the high lateral resolution, a gain in transmission of up to two orders of magnitude can be obtained. The instrument excels in a variety of contrast mechanisms (photo-emitted and reflected electrons) and in different operation modes (microscopy, spectroscopy, and diffraction) and therefore enables a comprehensive surface characterization [3]. The principle of the mirror corrector and an exemplary application in organic layer growth [4] will be discussed.

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[3] Th. Schmidt et al., *Surf. Rev. Lett.* **9** (2002) 223.

[4] H. Marchetto et al., *Chem. Phys.* **325** (2006) 178.