

Imaging Spin Filter for NanoESCA based on Au/Ir or oxide passivated Fe

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The energy-filtered photoelectron microscope NanoESCA [1,2] is a powerful tool for various application including work-function mapping, imaging XPS and in the last years more prominently for momentum microscopy on 2D materials (e.g. see [3]).

This analyzer can be used with an efficient spin filter that enables to image a 2D-distribution of the electron spin polarization by scattering the electrons at a polarizing target. We will show results from the first commercial build Au/Ir Imaging Spin Filter. Sherman functions of +68% and -58% were found at a reflectivity of more than 1% (also see literature [4]).

Spin-filtered images of magnetic domains show that along the diameter of the field of view more than 100 separate image points can be resolved. This increases the effective 2D figure-of-merit of this analyzer by nearly four orders of magnitude compared to single-channel spin detectors. We also present proof of principal measurements of an Imaging Spin Filter with oxide passivated Fe as scattering target [5]. Oxide passivated Fe allows for an easy switch of the polarization detection direction, like it is known from FERRUM detectors [6] for ARPES.

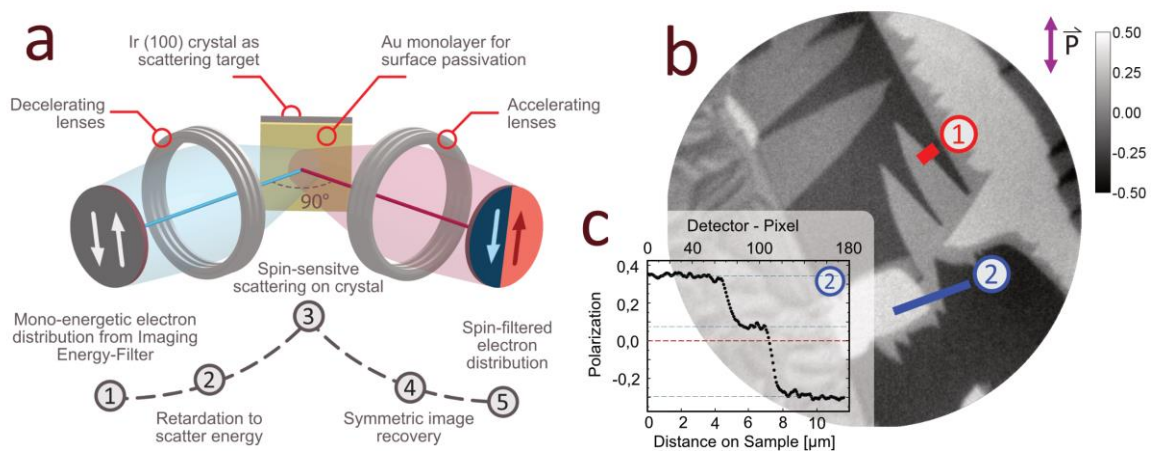


Figure 1: The monochromatic electron image delivered by the NanoESCA is spin-filtered by a scattering process (a) which allows to measure the spin polarization of the whole image simultaneously, e.g. magnetic domains of a poly-crystalline iron film (b). The field-of-view of this real-space microscopy image was set to a diameter of 66 μm . Line-scans along the domain boundaries (c) show the contrast and precision of the method.

References

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