Photoelectron spectromicroscopy at Elettra: recent advances and perspectives

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The fast progress in the development and implementation of photoelectron spectromicroscopy techniques started in the last decade of 20th century with the construction of low emittance X-ray synchrotron machines, providing tunable energy photon beams with very high brightness and variable polarization [1–3]. Thanks to the high photon intensity provided by insertion devices it has been possible to add sub-micrometer lateral resolution to X-ray photoelectron spectroscopy (XPS), which has enabled exploiting chemical, electronic and magnetic inhomogeneities at surfaces and interfaces as well as the properties of individual nanostructured objects.

The unique opportunities for exploring surface and interfacial properties of technologically relevant materials through photoelectron spectromicroscopy were endorsed at the late eighties by the founders of Elettra synchrotron laboratory, where currently four photoelectron microscopes are in operation. Although none of these microscopes was invented at Elettra, most of them have undergone technical innovations and incremental improvements in order to reach or define the-state-of-the-art performance. In this presentation the current capabilities of chemical imaging and micro-spectroscopy using full-field or scanning based instruments at Elettra will be illustrated placing the emphasis on advances for overcoming the pressure gap limits and prospects for studies in magnetism and spin-resolved images of FERMI surfaces. Several examples of state of the art experiments will be presented showing how this Elettra suite of microscopes can fulfil the needs of a broad science community and stimulate the scientific attitude of young researchers.

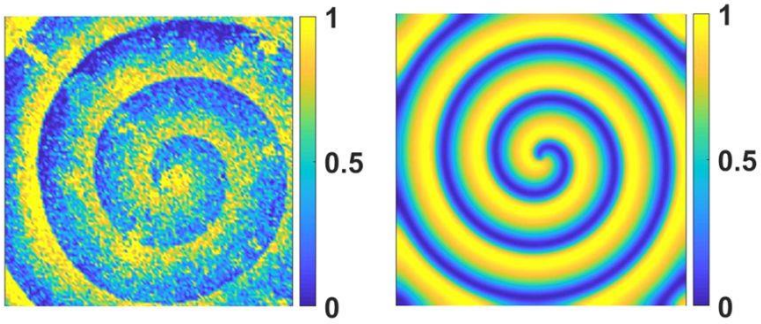

Figure 1: comparison between (A) measured SPEM map and (B) computed morphochemical distribution of an Ag−In pattern obtained by controlled electrodeposition.

References:

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