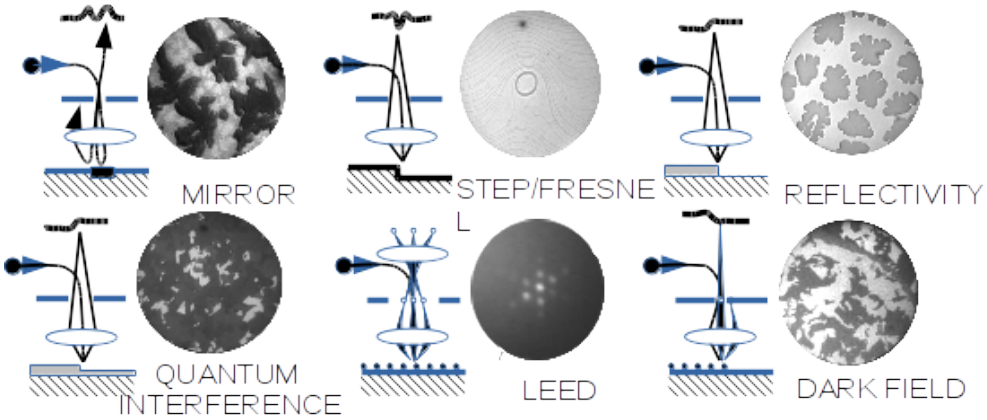
A LEEM for the dynamical study of surfaces in Spain

Juan de la Figuera[1], Adrian Quesada[2]

[1] *Instituto de Química Física "Rocasolano", Madrid E-28006 (Spain)*
[2] *Instituto de Cerámica y Vidrio, Madrd E-28049 (Spain)*

Low-energy electron microscopy (LEEM [1,2]) is a technique uniquely suited to perform dynamical observations of surfaces with nanometer resolution under vacuum. A parallel beam of electrons is deflected onto a sample by a prism optic. The electrons decelerate as they approach the surface because of an electrical bias applied to the sample. Electrons backscattered from the surface are accelerated and deflected by the prism into an imaging column and finally onto an imaging detector. Apertures in the illumination and imaging columns control the size of the electron beam on the sample and the electrons that strike the detector, respectively. There are many modes of operation of the instrument, and different sources of contrast in LEEM images, as shown in the figure. For example, it can acquire electron diffraction patterns from local sample areas and form images from the zeroth order electron beam (bright field imaging) or higher order diffraction beams (dark field imaging), locate atomic steps or detect areas of a film with different thicknesses at the atomic level.



This poster serves as an introduction of some of its possibilities, so the spanish community can take advantage of the instrument which has been recently installed at the Instituto de Química Física "Rocasolano". Note, though, that all LEEMs can also perform photoemission electron microscopy (PEEM) if the appropriate light source is available. In fact, Spain has had a LEEM/PEEM instrument at the Alba synchrotron in Barcelona in operation since 2012 [3]. However the real power of LEEM is being able to prepare materials under the carefully controlled conditions possible in an UHV-based instrument and track in real time the material's evolution.

References

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