Departamento de Física de Materiales

SEMINARIO

Electronic structure of FeO, γ-Fe_2O_3 and Fe_3O_4 epitaxial films using high-energy spectroscopies

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Today, one of the materials science goals is the production of novel materials with specific and controlled properties. Material composites, which combine different materials, with specific and defined properties mostly of multilayer thin films, are a promising way to create products with specific properties, and, in general different of those of the constituents. The chemical, mechanical, electric and magnetic properties of such materials are often intimately related to the structure, composition profile and morphology. Thus, it is crucial to yield with an experimental set-up capable to investigate different aspects related with the electronic and geometric structure under identical experimental conditions, and, in particular, to differentiate between surface and bulk properties. There are few techniques able to provide an accurate insight of what is happening at these interfaces, which in general are buried by several tens of nanometres in the material. The Spline beamline Branch B offers unique capabilities in this respect.

In the first part of my talk, I will provide a short overview of the present and future performance of the HAXPES-XRD station available at SpLine. It is well-known that iron metal has the ability to form a wide variety of oxides with completely different physical and chemical properties. In the second part of the talk, I will present structural, electronic, and morphological characterization of epitaxial thin films of FeO, Fe_3O_4, and γ-Fe_2O_3 grown on $SrTiO_3$(001), using oxygen assisted pulsed laser deposition (PLD), Hard X-ray Photoelectron Spectroscopy (HAXPES), High Energy Electron Energy Loss Spectroscopy (HREELS), Grazing Incidence X-ray Diffraction (GIXRD), X-ray Reflectivity (XRR) and X-ray Absorption Near Edge Structure (XANES).