BASQUE CENTER FOR MATERIALS, APPLICATIONS & NANOSTRUCTURES

ehu group

Postdoctoral position (#1/2)

Title: Magnetic interactions and interface phenomena in nanostructured thin films
Character: Experimental

Context

Granular alloys, composed of magnetic nanoparticles embedded in a metallic matrix, have attracted a great deal of attention from materials scientists since several years ago because of their unique magnetic and magnetotransport properties. These properties depend strongly on different factors: shape, size, concentration and interface of the nanoparticles. At very low concentrations, each of the nanoparticles behaves individually, but as the concentration increases, interparticle magnetic interactions become more relevant and a collective magnetic behavior is found. In order to carry out a thorough study of the role of the interactions and the interface phenomena, we propose to prepare thin film granular alloys with different nanoparticle concentration but the same size. We want to control the critical concentration at which we cross from individual to collective magnetic behaviour. We are also interested in preparing different nano-patternings by self-assembling polystyrene nanosphere lithography and interference lithography. Using nano-patterning we will be able to modify the correlation length and control the collective magnetic behaviour.

Tasks

There are different tasks to aboard: 1. Prepare magnetic nanoparticles of different 3d element (Fe, Co, Ni) embedded in a metallic non-magnetic matrix (Ag, Au) 2. Determine the magnetic percolation threshold. 3. Establish the role of the interface and the matrix. 4. Modify the magnetic interaction by nano-patterning.
Methods to be used: 1) Sputtering deposition technique; 2) Self-assembling polystyrene nanosphere lithography and interference lithography; 3) Structural characterization: X-rays and neutron diffraction, TEM, X-ray Absorption spectroscopy; 4) Magnetic characterization: SQUID and VSM magnetometers for DC and AC magnetization measurements; Kerr microscopy; X-ray magnetic Circular Dichroism; 5) Magnetotransport characterization: Giant Magnetoresistance, Extraordinary Hall effect.

Requirements

PhD on Materials Science, Condensed Matter Physics or similar. Candidates should have experience in thin film preparation and characterization. Synchrotron radiation techniques experience advisable.

Application

Send a CV, motivation letter and two references to jobs@bcmaterials.net

Dead line: August 15th, 2012, 24:00 h GMT