Fe/MgO NANOPARTICLES DEPOSITED ON NANOSTRUCTURED $La_{2/3}Sr_{1/3}MnO_3$ THIN FILMS

Z. Konstantinović, C. Martinez-Boubeta, Ll. Balcells, B. Martinéz
Institut de Ciència de Materials de Barcelona, CSIC, Campus UAB, 08193 Bellaterra, Spain
zorica@icmab.es

The appearance of new functionalities and devices arising from size- and shape-dependent properties has triggered the interest in creating well-defined structures at nanometric scale. However, the fabrication of artificial nanostructures appears to be a very difficult task requiring sophisticated technologies. The self-organized processes offers an alternative route to generate nanometric-scale objects of controlled size and shape together with long-range ordered, required for most practical applications. Growth conditions that cause the well-defined nanostructured surface have gained wide-spread interest for the implementation of self-assembled 1D and 0D nanostructures.

Oxides are one of the largest families of new materials which attract great attention due to their rich physics. Among them, the manganese perovskites showing colossal magnetoresistance and half metallic characteristics have emerged as good candidates for miniature spintronic devices. Complex oxide thin films are often elastically strained and this lattice strain can, in some cases, select preferential growth modes leading to the appearance of different self-organized morphologies. On the other hand, self assembly of magnetic nanoparticles on top of technological substrates (such as manganese perovskites) becomes a very useful technique for the fabrication of nanostructured materials.

In this work we report preliminary results on the controlled fabrication of self-assembled nanostructures in $La_{2/3}Sr_{1/3}MnO_3$ (LSMO) thin films grown on top of $SrTiO_3$ (100) and MgO (100) oriented substrates. On top of these films, a new nanostructured system, made of crystalline Fe particles covered by a uniform 2-3 nm thick MgO epitaxial shell, is spread. The magnetic properties of these heterosystems are discussed.