Magnetic Domains in CoCrPt films with Perpendicular Magnetic Anisotrpy

N. Soriano[1], D. Navas[2], C. Redondo[1], C. A. Ross[3], R. Morales[4,5]

[1]Department of Chemical-Physics, University of the Basque Country UPV/EHU, 48940 Leioa, Spain
[2]IFIMUP-IN and Departamento Física e Astronomia, Universidade do Porto, 4169-007 Porto, Portugal
[3]Materials Science and Engineering Department, MIT, Cambridge, Massachussets 02139, USA
[4]Department of Chemical-Physics & BCMaterials, University of the Basque Country UPV/EHU, 48940 Leioa, Spain
[5]IKERBASQUE, Basque Foundation for Science, 48011 Bilbao, Spain
nastassiasemiramis.soriano@ehu.es

CoCrPt alloy thin films, with strong uniaxial magnetocrystaline anisotropy, have been studied for the design and development of perpendicular magnetic recording media. The nanoscale patterning of these films has also been considered of great interest in patterned magnetic recording media, as well as for sensors and logic devices applications. [1,2] In this work, we study the magnetic domain dynamics of continuous and patterned CoCrPt films. An Interference Lithography (IL) system has been used to design pattern templates on silicon wafers. A 5 nm seed layer of Ti followed by 10 nm of CoCrPt and 3 nm Ti capping layer were deposited on the templates using an RF sputtering system at room temperature. Lines and dots patterns with periodicities ranging from 1000 to 700 nm and features sizes from 400 to 800 nm were fabricated. Magnetic characterization was performed using a vibrating sample magnetometer (VSM) and a magneto-optical Kerr (MOKE) microscope. An atomic force microscope (AFM) was used for topographic characterization. Magnetic domains in CoCrPt film nucleate and grow with the external field resembling a fractal structure. However, the reversal of patterned CoCrPt films follows a different mechanism due to confinement effects. This work was supported by grants: EU FP7-IRSES-318901, Spanish MINECO FIS2013-45469 and FIS2016-76058

References

[1] C. J. Sun et al., J. Appl. Physics, 93 (2003) 8725
[2] D. Navas et al., J. Appl. Physics, 105 (2009) 113921

Figures

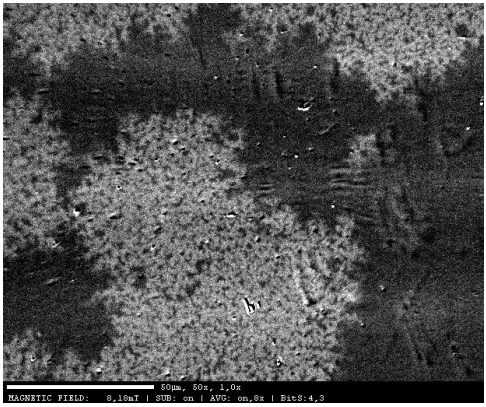

Figure 1: MOKE image of magnetic domains in a 10 nm CoCrPt film.