**Effect of carbon doping on Ge(001)/Mn5Ge3 thin films grown by magnetron sputtering technique**

A. Alvídrez-Lechuga1, R. López-Antón2, L. E. Fuentes-Cobas1, J. T. Holguín-Momaca1, C. Santillán-Rodríguez1, S. F. Olive-Méndez1

*1Centro de Investigación en Materiales Avanzados, S.C. (CIMAV), Miguel de Cervantes 120, C.P. 31136, Chihuahua, Chih, Mexico.*

*2Instituto Regional de Investigación Científica Aplicada (IRICA), Departamento de Física Aplicada, Universidad de Castilla-La Mancha, 13071 Ciudad Real, Spain.*

Email: adriana.alvidrez@cimav.edu.mx

In the last decade Mn5Ge3 thin films have attracted much attention due to their magnetic and structural properties, well-suited for spintronics [1]. One of the major challenges on the design of spintronic devices, as the spin-FET, is the achievement of spin injection into a semiconductor at room temperature (RT) [2]. A heterostructure that provides a better approach for this purpouse is a ferromagnetic (FM)/semiconductor multilayer with a Schottky barrier at the interface. Mn5Ge3 compound has become an important material for its FM ordering with a TC = 296 K, that increases with carbon doping. The hexagonal crystal structure allows the growth on Ge(111) substrates within a lattice mismatch of 3.7%. However, Ge(111) is not compatible with the Si(001) technology [3]. Ge(001)/Mn5Ge3 heterostructures offer the possibility of spin injection into IV-group semiconductors.

This work shows the synthesis and characterization of Ge(001)/Mn5Ge3 thin films elaborated by magnetron sputtering using the solid phase epitaxy (SPE) method at 250 °C. Figure 1(a) shows the bi-dimensional grazing incidence x-ray diffraction (2D-GIXRD) patterns collected at beamline 7.1 MCX (Elettra Synchrotron) for a sample without carbon and (b) a sample doped with carbon. Both patterns show discontinuous Debye rings that are associated to the texture. Figure 1(c) shows a representative high resolution transmission electron micrograph related to the epitaxial growth of a sample grown by co-deposition of Mn and C, followed by a co-deposition of Mn, Ge and C.

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**Figure 1.** 2D-GIXRD comparison between a sample (a) without carbon and (b) a sample doped with carbon. (c) A sample grown by co-deposition of Mn and C, followed by co-deposition of Mn, Ge and C.

**References**

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