T4-P12: Synthesis of hard magnetic nanocomposites based on exchange interaction in oxidic systems

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The magnetic nanostructured systems, constituted from magnetically hard and soft phases that interact by magnetic exchange coupling, are potential candidates to replace the conventional single-phase materials. Here we report the synthesis by chemical route of the exchange coupled ferrites nanocomposites, using the $BaO \cdot 6Fe_2O_3$ and $CoO \cdot Fe_2O_3$ as hard magnetic, respectively soft magnetic phases. The subsequent calcination converts the assembly into $BaO \cdot 6Fe_2O_3/CoO \cdot Fe_2O_3$ nanocomposites, which exhibit hard magnetic characteristics, due to the effect of exchange interaction occured between the two phases. The prepared nanocomposites were structural, through XRD and magnetic, through magnetometry, characterised. The values reached for saturation magnetisation are 40 – 50 emu/g and for coercivities 1000 – 2000 Oe. The obtained value of ratio between remanent magnetisation and saturation magnetisation greater than 0.5 ($M_r/M_S = 0.52$) that the two phases are exchange coupled.

T4-P13: Structural and functional studies on LSMO thin films with possible application in spintronics

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LSMO ($La_{0.875}Sr_{0.125}MnO_3$) thin films were deposited on LSAT ($Sr_{0.7}La_{0.65}Al_{0.65}Ta_{0.35}O_3$) substrates in order o investigate their possible use in spintronic devices. The epitaxial grown films of 120 nm thick were structural and compositional characterized using X-ray diffraction and X-ray photoelectronic spectroscopy. Thin film magnetic properties were investigated by electron paramagnetic resonance. Temperature dependences of electrical and magnetic properties were also investigated and discussed.

Acknowledge: This work was supported by the ANCS, Ministry of Economy, Trade and Business Environment, through the National Program Capacities, Project no. 257/28.09.2010 (Acronym CERNESIM) and the bilateral contract no. 04-4-1121-2015/2017 (IUCN no. 96/15.02.2016, JINR Dubna).

T4-P14: Spin dependent transport properties in magnetic tunnel junctions with NaBr-AgBr based barriers

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The transport properties of $Fe/Na_{1-x}Ag_xBr/NaBr/Na_{1-x}Ag_xBr/Fe$ and Fe/AgBr/*m*NaBr/AgBr/Fe magnetic tunnel junctions were studied by means of self-consistent atomistic first principles calculations. A model interface with Fe atoms sitting atop of Ag(Na) and Br positions has been considered. The ballistic electronic transport properties in the current-perpendicular-to plane (001) geometry and zero bias field were analysed.

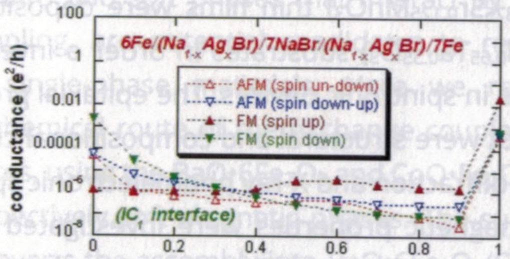

Fig. 1. FM and AFM conductances of $Fe/Na_{1-x}Ag_xBr/NaBr/Na_{1-x}Ag_xBr/Fe$ tunnel junctions

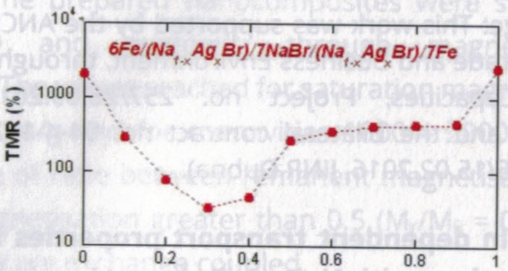

Fig. 2 TMR values for $Fe/Na_{1-x}Ag_xBr/NaBr/Na_{1-x}Ag_xBr/Fe$ tunnel junctions

In the case of $Na_{1-x}Ag_xBr/NaBr/Na_{1-x}Ag_xBr$ barriers, the conductances decrease in the composition range $0.2 \leq x \leq 0.8$ (Fig.1). High TMR ratios, of 10^3 %, have been evidenced for the end series compositions (Fig.2). The conductances decrease exponentially with the barrier thickness in the case of Fe/AgBr/*m*NaBr/AgBr/Fe MTJ. The largest contribution to the FM conductance results from the spin-up electrons. The $k_{||}$ resolved conductances of FM and AFM states are also analysed.

This work was supported by the Romanian Ministry of Education and Research (UEFISCDI), grant no. PN-II-ID-PCE-2012-4-0028.

T4-P15: Two-step spin transition driven by lattice architecture in spin crossover coordination polymers

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The potential applications of spin crossover (SCO) materials as temperature and pressure sensors [1], actuators, memory devices or electrical switches [2] and their possible spin state control at the molecular level are some important assets of these fascinating switching materials. In the last years several experimental and theoretical studies concerning the role of cooperativity in SCO compounds have been reported [3,4] giving a great attention to stepwise transitions in particular those presenting a two-step SCO behavior. It is nowadays commonly accepted that this type of switching phenomenon