Magnetic Interfaces and Nanostructures
Room: Hall D - Session MI-TuP

Magnetic Interfaces Poster Session

MI-TuP3 Fabrication and Magneto-Optical Properties of Co-doped ZnO Hollow Nanospheres, ***Da-Ren Liu***, *C.J. Weng*, ITRC, NARL, Taiwan, Republic of China

Diluted magnetic semiconductors (DMS) have recently attracted considerable attention due to their potential applications for spintronic devices. ZnCoO is one of the most promising diluted magnetic semiconductors materials due to its room temperature ferromagnetism. In this study, Al_2O_3 layer was conformally deposited on the surface of polystyrene (PS) nanoshpere with different diameter (300nm~800nm) by atomic layer deposition (ALD). After removal of PS nanosphere by heating, Al_2O_3 hollow nanospheres were formed. Then the $Zn_{1-x}Co_xO$ (x=0.03, 0.05, 0.07) coatings were grown on Al_2O_3 hollow nanospheres by pulsed laser deposition(PLD). According to the results of high-resolution x-ray diffraction, Co-doping does not change the wurtzite structure of ZnO and the $Zn_{1-x}Co_xO$ hollow nanospheres are polycrystalline. The surface and cross-section morphologies of the hollow nanospheres were analyzed using a field-emission scanning electron microscope (FE-SEM). Photoluminescence spectra demonstrate ultraviolet emission peaks which have shift with the increase of Co ion concentration. The magneto-optical properties of the nanospheres were measured by micro-MOKE and x-ray magnetic circular dichroism (XMCD) spectroscopy. The results show the magnetic properties of $Zn_{1-x}Co_xO$ hollow nanospheres strongly depend on the Co composition fraction.

MI-TuP4 Study of Structural, Electronic and Magnetic Properties of (Fe2O3)n Clusters Using Density Functional Theory, ***Sholeh Alaei***, *S. Erkoc*, Middle East Technical University, Turkey, *S. Jalili*, Computational Physical Sciences Research Laboratory, School of Nano-Science, Institute for Research in Fundamental Sciences (IPM), Iran (Islamic Republic of)

In this paper, the electronic, magnetic and structural properties of $(Fe_2O_3)_n$ (n = 2-5) clusters were studied using Density Functional Theory. It came out that the most stable structures for n = 2, 3 and n = 4, 5 were ferrimagnetic and antiferromagnetic, respectively. The states with completely geometrical symmetry were spin-symmetric also, i.e. had equal atomic magnetic moments. It was found that by increasing 'n', the binding energy (E_b) increased, while such an observation was not seen for n = 4 and n = 5 and the binding energies were equal in these cases. An interesting result was that one of the states for n = 4 (n4-1) was a half-metallic antiferromagnet, which is important in spintronics applications. The most of the considered clusters were semi-metal or half-metal due to presence of Fe atoms.

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