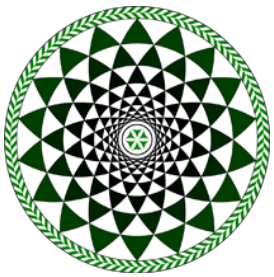

Contribution ID: **62** Type: **oral presentation**

Experimental evidence of „dead" magnetic outer shell in nanoparticle manganites $RMnO_3$ (R = Pr, Nd, Tb)

Wednesday, 5 July 2017 10:40 (20 minutes)

The results of magnetic measurements for the $La_{0.667}Ca_{0.333}MnO_3$ nano samples indicate an existence of not magnetically ordered outer shell [1].

In order to investigate this phenomenon magnetic and neutron diffraction measurements for $RMnO_3$ (R = Pr, Nd, Tb) nano manganites have been performed. The samples were obtained by a sol-gel technique and afterwards annealed at different temperatures between 800 and 900 °C. The crystal structure and the grain size were determined by the XRD method. The compounds crystallize in orthorhombic crystal structure (SG *Pnma*). Magnetic measurements were performed with the use of VSM and ACMS options of the Quantum Design PPMS platform. The neutron diffractograms were obtained in temperature range 1.5 −50 K using the E6 diffractometer installed at the BERII reactor. Ac magnetic data indicate spin glass properties for the $RMnO_3$ (R = Pr, Nd) nano samples. Neutron diffraction data confirm spin glass properties for the $PrMnO_3$ sample annealed at 800 °C while for those annealed at 850 and 900 °C as well as for Nd samples a magnetic order, similar to that observed in poly-samples, is observed with lower values of the magnetic moments.

The dc magnetic data for $TbMnO_3$ indicate that the Nèel temperatures for nanosamples (7.1 −7.4 K) are lower than that of poly sample (9.2 K). Neutron diffraction data for nanosamples indicate that the peaks of magnetic origin of are broad and the determined values of magnetic moments are lower than the one found for the poly sample.

A thickness (t) of nonmagnetic shell may be determined from the formula $t = 1/2d[1 - (\mu_n/\mu_p)^{1/3}]$ where d is a grain size while μ_n and μ_p refer to magnetic moment in nano and poly samples, respectively.

Presented results are in good agreement with those presented in Ref. [1]. The values of thickness t found from magnetization and neutron diffraction data indicate that the external magnetic field causes a decrease of magnetically dead layer.

References

[1] M.A. Lòpez-Quintela et. al., *Nanotechnology* **14** (2003) 212.

Primary authors: Prof. SZYTUŁA, Andrzej (Jagiellonian University); Dr BARAN, Stanisław (Jagiellonian University)

Co-authors: Dr HOSER, Andreas (Helmholtz-Zentrum Berlin für Materialen und Energie GmbH, Hahn-Meitner Platz 1, D-14 109 Berlin, Germany); Prof. DYAKONOV, Vladymir (Institute of Physics, PAS, Al. Lotników 32/46, 02-668 Warszawa, Poland)

Presenter: Prof. SZYTUŁA, Andrzej (Jagiellonian University)

Session Classification: Spectroscopy & Neutron Research

Track Classification: Surfaces and interfaces