Nanocomposites and nanomaterials

Structural and resonance properties of (La,Ba)MnO_3/ZnO/ $SrTiO_3$ (001) nanostructure

T.I. Polek[1], D.M. Polishchuk[1], A.I. Tovstolytkin[1]

[1]Institute of Magnetism, National Academy of Sciences of Ukraine, 36b Vernadsky Ave., Kyiv 03680, Ukraine.
E-mail: polek.taras@gmail.com

Oxide materials have become important components of modern electronics. Among various approaches to the use of oxides, an especially promising one is to fabricate heterostructures with specific combinations of properties, inherent to separate components, and create functional elements on their basis, such as elements of memory devices, organic LED, resistance switching devices and others [1].

Perovskite manganites have unique properties, in particular they display a phase transition between ferromagnetic metallic state and paramagnetic semiconducting one with *p*-type charge carriers. On the other hand, ZnO is a typical *n*-type semiconductor with a wide bandgap. To date, there have been reports about successful fabrication of manganite - zinc oxide heterostructures [1, 2], but only limited information on the properties of such structures is available.

In this work (La,Ba)MnO_3/ZnO heterostructure fabricated by ion beam sputtering have been investigated. X-ray diffraction studies have shown that each layer is single phase. Magnetic phase composition of the magnetic subsystem (La,Ba)MnO_3, studied by electron spin resonance, has revealed coexistence of para- and ferromagnetic phases over a wide temperature range. Based on the obtained data, the conclusions have been made about the relationship between the peculiar behavior of rectification factor [3] of (La,Ba)MnO_3/ZnO/$SrTiO_3$ (001) nanostructure and temperature evolution of magnetic phases.

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