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Control of electrical and magnetic properties of Mn thin film on BaTiO3 ANH TUAN DUONG, YOOLEEMI SHIN, VAN QUANG NGUYEN, University of Ulsan, DUC DUNG DANG, Ha Noi University of Science and Technology, SUNGLAE CHO, University of Ulsan — Bulk Mn material is one of transition metals that has been well known as an antiferromagnetic material due to an anti-parallel spin alignment with negative exchange integral. However, theory predicted that the magnetic properties of Mn can be transited to ferromagnetic with the expansion in volume following Hund's rule. A current active research topic is electric field controlled magnetism. To accomplish this goal, a way is to use multiferroic material. Epitaxial Mn thin film has successfully been grown on BaTiO3 substrate by using molecular beam epitaxy (MBE). We could control the degree of a structural deformation of Mn thin film using unique four different crystal structures of BaTiO3 below 400 K. We observed three jumps at 185, 290, and 390 K in temperature dependent electrical resistivity, corresponding to the temperatures of structural phase transitions in BaTiO3. The modification of magnetism from antiferromagnetism to ferrimagnetism in Mn film was observed. We also observed two jumps at 290 and 365K in the temperature dependent magnetization. The calculated magnetic moment was 0.66 μB/Mn at 320K. These results indicate the possibility of the tuning of electrical and magnetic properties from antiferromagnetic to ferrimagnetic or vice versa in Mn film by modulating strain.

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