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Mn Thin Film on BaTiO₃ Substrate: Modified Electrical and Magnetic Properties

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Magnetic properties of 3d transition metals were determined by exchange interaction between magnetic ions that was characterized by the exchange integral. Bulk Mn material is one of transition metals that have been well known as an anti-ferromagnetic material due to an anti-parallel spin with negative exchange integral. Here we report on the MBE growth of Mn on BaTiO₃ (001) substrate and induced ferromagnetism. The bcc α -Mn single crystal film has been grown on BaTiO₃ (100) substrate. The XRD and Raman results indicated that the structural phase transitions of BaTiO₃ substrate induced a lattice distortion at the interface. Consequently, the grown Mn film exhibits ferromagnetism with strong saturation magnetization of 495 emu/cm³ at 320 K. The electrical resistivity of the Mn film strongly depended on the crystal structure of BaTiO₃ substrate.

Keywords: MBE, 계면 수송, 자성