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Magnetic and thermoelectric properties of $Fe_{3-x}Co_xO_4$ thin films and $CoFe_2O_4/Fe_3O_4$ superlattices QUANG NGUYEN VAN, University of Ulsan, Korea, MENY CHRISTIAN, Institute of Physics and Chemistry for Materials of Strasbourg, UMR 7504 UDS-CNRS, Strasbourg, France, ANH TUAN DUONG, YOOLEEMI SHIN, RHIM S. H, MINH HAI NGUYEN THI, SUNGLAE CHO, University of Ulsan, Korea — Microcrystalline ferrites are used as a medium for the magnetic recording and storage of information. Magnetite, Fe_3O_4, is a ferrimagnet with a cubic inverse spinel structure and exhibits a metal-insulator, Verwey, transition at about 120 K. It is predicted to possess as half-metallic nature, $\sim$ 100% spin polarization, and high T_C (850 K). Cobalt ferrite, Co_3O_4, is one of the most important members of the ferrite family, which is characterized by its high H_C, moderate magnetization and very high magnetocrystalline anisotropy. Here we report on the magnetic and thermoelectric properties of $Fe_{3-x}Co_xO_4$ (x = 0 to 1) thin films and $CoFe_2O_4/Fe_3O_4$ superlattices grown on MgO (100) by MBE. XRD and RHEED patterns confirmed the inverse spinel structure of the Fe_3O_4 films. Magnetic properties of the $Fe_{3-x}Co_xO_4$ films are markedly sensitive to the Co content. The Verwey transition was disappeared in Co-doped films. A negative MR curve with butterfly shape was observed with low Co content but disappeared for the samples with x = 0.8 and 1. Seebeck coefficients increased with Co concentration; -70 μV/K for x=0 and -220 μV/K for x=1. We will also discuss on the relationship between magnetic and thermoelectric characteristics in $CoFe_2O_4/Fe_3O_4$ superlattices with the modulations of 5, 10, and 20 nm.

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