

Stress Effects CoCr_2O_4 Film on MgO and MgAl_2O_4 Grown by RF-Sputter Process

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Multiferroic CoCr_2O_4 film was deposited on MgO and MgAl_2O_4 substrates by the rf-sputtering process. The films were prepared at an RF-magnetron sputtering power of 50 W and a pressure of 10 mtorr (20 sccm in Ar), and at substrate temperatures of 550 °C. The crystal structure was determined to be a spinel ($Fd-3m$) structure by means of X-ray diffraction (XRD) with $\text{Cu K}\alpha$ radiation. The thickness and morphology of the films were measured by scanning electron microscopy (SEM) and atomic force microscopy (AFM). The magnetic properties were measured using a Superconducting Quantum Interference Device (SQUID) magnetometer. While the ferrimagnetic transitions were observed at about 93 K, which was determined as the Néel temperature, the magnetic properties all show different behaviors. The differences between the magnetic properties can be explained by the stress effects between CoCr_2O_4 and the substrates of MgO and MgAl_2O_4 .

Keywords : multiferroic, RF sputtering