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P-075 STRUCTURAL AND MAGNETIC PROPERTIES IN $CoAl_{0.1}Fe_{1.9}O_4$ THIN FILMS PREPARED BY A SOL-GEL METHOD

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Thin films of Al substituted cobalt ferrite layers on thermally oxidized silicon wafers were fabricated by a sol-gel method with various annealing temperatures. Structural and magnetic properties of the films were investigated with a x-ray diffractometer, a vibrating sample magnetometer (VSM) and atomic force microscopy (AFM). The thin fims were annealed at 300-800 °C with a 100 °C step in air atmosphere for 1 hour. The crystallization temperature for CoAl0.1Fe1.9O4 powder was determined to be 380 °C by using thermogravimetry analysis (TGA) and differential thermal analysis (DTA). All the films were found to be a single cubic spinel structure without any preferred crystallite orientation. The lattice constants monotonically decreased from 8.383to 8.358 Å with increasing annealing temperature from 400 °C to 800 °C, which means that the higher annealing temperature strengthens the inter atomic binding. On the other hand, as increasing annealing temperature from 300 °C up to 800 °C, their size of grain increased from 12 nm up to 28 nm, but the surface roughness was minimized at 600 °C and its value was 1.7 nm. Of all the films the parallel and perpendicular coercivity at room temperature showed maximum value in the sample annealed at 600 °C, such values were 2700 and 3400 Oe, respectively. Theses show that the coercivity is strongly dependent on not only annealing temperature but also surface roughness.