

Suthasinee Somboonsap 2013: Synthesis of Co-Cu Granular Films for Magnetic Sensing Application. Master of Science (Physics), Major Field: Physics, Department of Physics. Thesis Advisor: Miss Watcharee Rattanasakulthong, Ph.D. 106 pages.

In this research work, Co-Cu films with different sputtering times and compositions were prepared on glass and polyimide substrates by sputtering technique. Structural, magnetic, thermal and GMR properties of the films were investigated in application for magnetic sensor. Co-Cu films on both polyimide and glass substrate with different sputtering times show  $\text{Co}_{52}\text{Cu}_{48}$  solid solution phase in (111), (200) and (220) directions and paramagnetic phase. MR ratio of 0.29% was found in a Co-Cu film on polyimide substrate deposited for 40 min. The Co-Cu films on both polyimide and glass substrates with various compositions show Co (HCP) and Cu (FCC) phases in a (111) direction and exhibit ferromagnetic phase in the film consisted of Co fraction  $>$  around 34%. The Co-Cu film with the Co fraction  $<$  around 34% show paramagnetic phase. GMR ratio of 0.09% was found in a  $\text{Co}_{42.64}\text{Cu}_{57.36}$  film on polyimide substrate. In comparison of deposition rate of films on glass and polyimide substrates, the deposition rate of Co-Cu films on polyimide substrate is higher than that of on glass substrate. The thickness of the films with different sputtering times on glass substrate is between 0.551-2.53  $\mu\text{m}$  and on polyimide substrate is between 25.2-64.2  $\mu\text{m}$ . Additionally, surface roughness over 1  $\mu\text{m}^2$ -scan area of the films on glass substrate is around 0.551-2.53 nm and on polyimide substrate is around 0.551-2.53 nm. Electrical resistance of the films on glass and polyimide substrates is between 0.279-1.800  $\Omega$  and 0.426-9.895 $\Omega$ , respectively.

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Thesis Advisor's signature