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Annealing Effects on Morphology and Microstructure of IrMn Thin Films

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Recently, IrMn alloy were used as coupled layer with a ferromagnetic layer to increase sensitivity in magnetic sensing for magnetic data storage because this film can maintain high exchange bias strength even with ultra-thin layer. IrMn thin films were grown by magnetron sputtering technique. The films contained the face center cubic structure with Mn concentration in range of 65-80 wt.%. These films were annealed at different temperatures in Ar atmosphere and air. The surface of as-deposited film showed smooth surface and contained small grains. After annealing, Mn-oxide can be detected on the surface and exhibited subordinated peaks between 300-400 cm^{-1} and main peak at 662 cm^{-1} which match to Mn_3O_4. Nevertheless, XRD results in as-deposited film shows two main peaks of this film which are (111) and (200). Lattice constant of IrMn is 3.76 Å. Meanwhile, lattice constant of annealing film was slightly decrease. Furthermore, the annealing temperature became significant factors to the formation of Mn-oxide of IrMn material. The effects of annealing temperature on the formation of Mn-Oxide and microstructure will be discussed during the presentation.

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