

A study on the role of surface crystalline phase in amorphous ribbon using ferromagnetic resonance

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Much work has been done on the giant magnetoimpedance (GMI) in soft-magnetic Co-based amorphous wires and ribbons because of the high potential for magnetic sensor applications [1]. The drastic increase of GMI characteristics in the amorphous Co₆₆Fe₄B₁₅Si₁₅ ribbons seem to be attributed to the surface crystalline phase formed by field annealing. In this work, the GMI profiles have been measured in the amorphous ribbons annealed at a temperature of 380°C for various annealing times in open air, and ferromagnetic resonance (FMR) experiment has been done in order to investigate the effect of surface crystalline phase on the GMI profiles. The GMI valve characteristic increased with increasing annealing time, and decreased with increasing frequency. The FMR resonance field of amorphous ribbon did not changed under the parallel field, but it was shifted to low field region under the orthogonal field due to surface oxidation. Structural characterization, performed by FMR revealed the role of hard magnetic phase on surface microstructures of crystalline phase. The GMI valve characteristic seems to be related with exchange coupling of the bias field with magnetization caused by crystalline phase on the surface of soft amorphous phase.

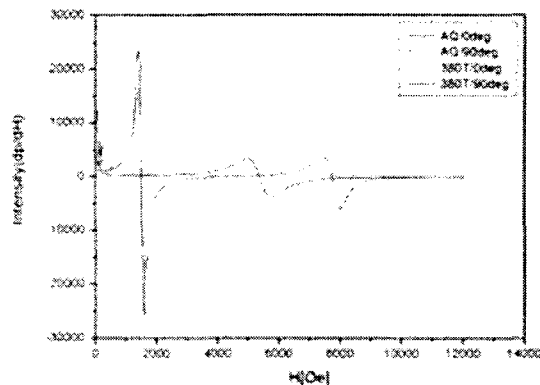


Fig.1. FMR Spectra of as-received and annealed sample. The external magnetic field is applied parallel and perpendicular in the film plane

References

- [1] C.G. Kim, K.J. Jang, D.Y. Kim, S.S. Yoon, Appl. Phys. Lett. 75 (1999) 2114