Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Giant magnetoimpedance effect of Co-based magnetic ribbon as a chemical sensing probe[1] ALEJANDRO RUIZ, JAGANNATH DEVKOTA, PRITISH MUKHERJEE, HARIHARAN SRIKANTH, MANH-HUONG PHAN, University of South Florida — The giant magnetoimpedance (GMI) effect consists of a large change in the AC impedance of a soft ferromagnetic conductor subject to an external dc magnetic field that forms the basis for developing a new generation of magnetic sensors. Since the impedance of a soft ferromagnetic material is a function of the skin depth at radio frequency region, the GMI effect of the material can be modified via changes in the resistivity and permeability even at a fixed frequency. This effect arises due to the change in the magnetic anisotropy, material geometry, or electrochemical changes. In the present study, we demonstrate the GMI-based detection of various concentrations of corrosive chemicals using an amorphous Co-based ribbon. Under corrosive fluids, the magnetic permeability and hence the GMI effect of the ribbon changes due to the surface modification of the ribbon. We have found that the GMI ratio decreases with time, reaches a minimum value at a certain time, and then remains almost constant with time. The change in the GMI ratio and the time to achieve a stable value depends on the corrosive strength of the used chemical. These results show promise in developing a new class of chemical sensor using the GMI technology.

[1]The research was supported by the Florida Cluster for Advanced Smart Sensor Technologies (FCASST) and by USAMRMC through grant numbers W81XWH-07-1-0708 and W81XWH1020101/3349

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Date submitted: 08 Nov 2012 Electronic form version 1.4