

Magnetic Behaviour of an Electrodeposited Nanoporous NiFe Thin Film

Gomes Filho, J. *¹ Simão, R. A. ²,
Sommer, R. L. ¹ and Guimarães, A. P. ¹

1 Centro Brasileiro de Pesquisas Físicas - CBPF, Brazil

2 Universidade Federal do Rio de Janeiro - UFRJ, Brazil

Abstract

Porous NiFe thin films, near PermalloyTM composition, were obtained by direct galvanostatic electrodeposition (1) using sputtered copper nanonetworks as cathodes (2, 3). NiFe films were produced with medium thicknesses of 10nm and 20nm, respectively. Their magnetic behaviours were analyzed by obtaining the correspondent planar hysteresis loops using a Superconducting Quantum Interference Device (SQUID). Hysteresis parameters like coercivity (H_c), remanence (M_r/M_s) and saturation (H_s) can be obtained from Figure 1. Huge differences observed in comparison to PermalloyTM bulk values, for example enhancements of two orders of magnitude in coercivity (bulk~2-3 Oe), can be explained by the pinning of spins suited at the interstices between pores. A purpose of this work is to initiate a series of studies of electrodeposited porous magnetic metallic thin films, including alloys with a wide range of compositions.