## Properties Magnetic in Thin films of FeNi/Cu/FeNi obtained by electrodeposition.

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Thin Films of FeNi/Cu/FeNi were attained by electrodeposition. The structure domain for the wires of FeNi/Cu/FeNi was studied with the Bitter method. Thin films of FeNi/Cu/FeNi are studied via isothermal remanent magnetization (IRM) and direct current demagnetization (DCD) methods with an applied magnetic field longitudinal and perpendicular to the film plane. Plot of the modified IRM (1-2 $m_r$ ) and  $m_d$  remanence curves as a function of magnetic field for the thin films of FeNi/Cu/FeNi was realized that confirm the existence of interactions between the nanoparticles.

Keywords: Magnetic interactions, Switching Field Distributions.

## 1. Introduction

Switching Field Distributions for the thin films is actual importance for their use in the magnetic recording technology, and as an ideal magnetic memory medium. Thin films of FeNi/Cu/FeNi are authentic vital due to that these thin films present a perpendicular magnetic anisotropy (PMA).

## 2. Results and discussion

Fig. 3.1 shows three optic micrographics for thin films of FeNi/Cu/FeNi. Fig 3.1 c) shows optic micrographics of profile for the thin films of FeNi/Cu/FeNi with the ferrofluid and with a magnetic applied field perpendicular ( $H_{app}\neq 0$ ) to the plane of the film.



Figure 3.1: Optic micrographics for thin films of FeNi/Cu/FeNi: **c** profile for the film with the ferrofluid and with a magnetic applied field perpendicular to plane.

Magnetic properties of remanence were studied in thin films of FeNi/Cu/FeNi following the Wohlfarth relation:  $m_d = 1-2m_r$ . Where,  $m_r$  denote the normalized remanent magnetization after applying a magnetic field to the thin film in a demagnetized state with largest magnetic field of 225 Oe. Fig. 3.2 shows the IRM remanence curve  $m_r$  for the thin films of FeNi/Cu/FeNi measured with an applied magnetic field longitudinal and perpendicular to the plane.



Figure 3.2: IRM remanence curves,  $m_r$  of thin films FeNi/Cu/FeNi measured with an applied magnetic field longitudinal and perpendicular to the plane.

Fig. 3.3 shows the normalized SFDs for the thin films of FeNi/Cu/FeNi measured with an applied magnetic field longitudinal and perpendicular to the plane of the film. Here, the normalized SFD is obtained by first deriving the  $m_r$  curve for the thin films of FeNi/Cu/FeNi.



Figure 3.3: Normalized SFDs for the thin films of FeNi/Cu/FeNi measured with an applied magnetic field longitudinal and perpendicular to the plane.

Fig. 3.4 shows the Critical field of inversion of the moment magnetic of thin films FeNi/Cu/FeNi. It is showed that exist a change in the moment direction from easy direction to a direction perpendicular, it is known as the phenomenon spin flop. It is seen that the critical field for the inversion for the thin films FeNi/Cu/FeNi is of 50 Oe.



Figure 3.4: Critical field of inversion of the moment magnetic of thin films of FeNi/Cu/FeNi.

## References

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