

Abstract Submitted
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The Effect of Plastic deformation on the Magnetic Properties of thin Iron and Permalloy Films¹

AMANDA GREGORY, KYLE SMITH, CLAYTON MOORE, ANUP BANDYOPADHYAY, DAN PALMER, WIM GEERTS, Texas State University, San Marcos, MARTIN SABLİK, SWRI, San Antonio — Understanding the influence of stress on the magnetic properties of thin films is vital if one wishes to apply them in devices. Although extensive work has been done on the magneto-elastic properties, little research has been done on the magneto-plastic properties of thin films. In order to investigate these effects, we deposited thin Fe and NiFe films on polished and non-polished superelastic nitinol sheet metal by ion beam sputtering. The magnetic properties before and after plastic deformation of the thin films were determined by VSM. The films were plastically deformed either by linear extension using an Materials Tester, or by bending the samples over a cylinder. The linear stretching experiments resulted in an inhomogeneous strain throughout the sample showing the pseudo-elastic properties of the superelastic nitinol. In the large strain areas the thin film would be removed from the nitinol substrates while in the low strain areas the thin film appeared to be unaffected. The bending experiments, on the contrary, yielded an apparently homogeneous strain through the thin film. The magnetic properties of these strained samples will be discussed.

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