Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Measuring Transport Properties of Thin Films Under Isotropic and Anisotropic Strain Using Piezoelectric Substrates S. WOLGAST, C. KURDAK, Department of Physics, University of Michigan, Ann Arbor, Michigan 48109, A. GAITAS, W. ZHU, PicoCal, Inc., 333 Parkland Plaza, Ann Arbor, Michigan 48103 — Thin film systems have been of great technological interest in the last few decades due to their unique properties. It is crucially important to understand transport properties of such films under strain for some applications such as in strain gauges. Piezoelectric materials have been used in the past to study the isotropic strain-dependent properties of magnetotransport devices. We have extended this technique using one of the shearing modes of a Lead Magnesium Niobate-Lead Titanate (PMN-PT) crystal poled in the <011> direction to study anisotropic strain in thin films. A double Hall Bar pattern oriented along the eigenaxes of the piezoelectric shearing mode permits the characterization of the film in both directions simultaneously. A uniform field in the piezoelectric substrate may be achieved for patterned devices by growing a metal surface surrounding the entire pattern. We will discuss how the changes in the carrier density and electron mobility associated with strain can be characterized in thin metal films deposited directly on the PMN-PT substrate.

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Date submitted: 27 Nov 2010 Electronic form version 1.4