Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Detection of single magnetic bead using InAs micro-Hall sensors for biological applications GORAN MIHAJLOVIC, PENG XIONG, STEPHAN VON MOLNAR, MARTECH and Dept. of Physics, Florida State Univ., Tallahassee, Florida , KEITA OHTANI, HIDEO OHNO, Laboratory for Electronics Intelligent Systems, Research Institute of Electrical Communication, Tohoku Univ., Sendai, Japan , MARK FIELD, GERARD J. SULLIVAN, Rockwell Scientific Company LLC, Thousand Oaks, CA 91360 — We have fabricated and characterized micro-Hall sensors from InAs/AlSb quantum well heterostructures containing a two-dimensional electron gas. The sensors exhibit room temperature field sensitivities as high as 600 Ω/T, mobilities $>2\times10^4$ cm^2/V·s and low 1/f noise which result in an average field resolution down to the sub- gauss range. Measurements were carried out at temperatures below 150 K on a single submicron superparamagnetic bead (d$\sim$0.9 μm) that are intended to be used as magnetic labels in biological applications [1]. The magnetization showed expected Langevin behavior as a function of applied field with good signal to noise ratio, demonstrating good potential for the sensors to be used as a detection tool in biological applications. We have also measured the magnetic hysteresis for a single ferromagnetic Ni nanowire (d $\sim$ 200nm) using the device. Our ongoing efforts to demonstrate room temperature operation and to develop biocompatible detection schemes utilizing the micro-Hall sensors will be presented. This work was supported by NSF NIRT Grant ECS-0210332 [1] Q. A. Pankhurst et al., J. Phys. D **36** R167 (2003) .

Goran Mihajlovic
MARTECH and Department of Physics, Florida State University, Tallahassee, Florida 32306

Date submitted: 07 Dec 2004 Electronic form version 1.4