Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

InAs quantum well μ-Hall sensors for magnetic biosensing KHALED ALEDEALAT, S. HIRA, K. CHEN, Florida State Univ, G. MIHAJLOVIC, Materials Science Division, Argonne National Lab, P. XIONG, G. STROUSE, P.B. CHASE, S. VON MOLNAR, Florida State Univ, M. FIELD, G. SULLIVAN, Teledyne Scientific Company LLC — Magnetic sensing is potentially a sensitive and rapid technique for monitoring DNA-DNA and protein-DNA interactions. Here we present an effort on the noise characterization and selective biofunctionalization of InAs μ-Hall sensors for magnetic detection of DNA hybridization. Room-temperature noise measurements were performed in the frequency range from 20 Hz to 104 kHz. The noise equivalent magnetic moment resolutions were estimated to be $\sim 10^6 \quad \mu_B/\sqrt{Hz}$ and $\sim 10^4 \quad \mu_B/\sqrt{Hz}$ at 92 Hz and 23 kHz respectively. The active region of the InAs μ-Hall device was covered with sputter-deposited SiO_2 and Au pads were patterned on top of some of the Hall crosses. Thiolated ssDNA were assembled on the Au pads and the rest of the device platform was passivated with PEG-silane. Biotinylated and fluorescently-tagged complementary ssDNA were labeled with commercial streptavidin-coated 350 nm superparamagnetic beads, which were found to assemble selectively onto the Au pads through DNA hybridization using laser scanning confocal microscopy. This work was supported by NIH NIGMS GM079592.

Khaled Aledealat
Florida State Univ

Date submitted: 03 Dec 2007 Electronic form version 1.4