Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Applications of atomic magnetometry in chemical and biological imaging[1] SHOUJUN XU, LI YAO, NISSA GARCIA, DINDI YU, Department of Chemistry, University of Houston — Atomic magnetometry has been recently developed as the most sensitive technique for detecting magnetic field, especially low-frequency magnetic signal. However, its applications in chemistry and biomedicine have not been extensively explored. In addition, the applications are often limited by the bulky size and high operating temperature of the magnetometers. We report a sensitive and compact atomic magnetometer that has an optimal operating temperature of 37 degree. The small size of the atomic sensors significantly improves the coupling between the sample and the detectors. Using this magnetometer in a scanning detection scheme, we show high-resolution, quantitative imaging of magnetically-labeled antibody binding to targeted molecules. We also show applications of this technique in nuclear magnetic resonance and magnetic resonance imaging in the Earth's magnetic field: a pH-sensitive gadolinium chelate for low magnetic field is revealed, which can be potentially used for minimum-invasive pH mapping; fluid flow in porous metallic materials is measured, which overcomes the penetration problem associated with conventional magnetic resonance imaging. Further improvement for the magnetometer and new detection schemes will be discussed.

[1]This worked is partially supported by ACS PRF and Texas Cener for Superconductivity.

Shoujun Xu
Department of Chemistry, University of Houston

Date submitted: 10 Sep 2009 Electronic form version 1.4