Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

**Characterization of RNase Immobilization at Surfaces by NEXAFS** XIAOSONG LIU, Department of Physics, UW-Madison (DOP), CHANG-HYUN JANG, Department of Chemical and Biological Engineering, UW-Madison (DOCBE), FAN ZHENG, DOP, ASTRID JURGENSEN, CSRF, NICHOLAS L. ABBOTT, DOCBE, F.J. HIMPSEL, DOP — Immobilization of proteins at surfaces plays an increasingly-important role for applications in biosensors and biochips, bioelectronics, bio-compatible implants, and biomimetic devices. In this study, Ribonuclease A (RNase A) is immobilized on silver surfaces in oriented and random form via self-assembled monolayers (SAMs) of alkanethiols as described previously.[1] The immobilization process is characterized step by step using chemically-selective near edge x-ray absorption fine structure spectroscopy (NEXAFS) at the C, N, and S K-edges. Oriented protein layers exhibit a small, but distinct polarization dependence of the N1s to $\pi^*$ orbital that is delocalized over O=C-NH, which is not seen for random orientation. They also have higher coverage. Oxidation and partial desorption of the alkanethiol SAMs are found to be predominant causes of imperfect immobilization. The results show how NEXAFS is able to provide feedback for optimizing the immobilization of proteins. [1] Luk, Y.-Y.; Tingey, M. L.; Dickson, K. A.; Raines, R. T.; Abbott, N. L. *Journal of the American Chemical Society* **2004,** 126, (29), 9024.

Xiaosong Liu
Department of Physics, University of Wisconsin-Madison

Date submitted: 29 Nov 2005 Electronic form version 1.4