Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

**Interaction of thin-film microcoils with the air/water interface and applications in microfluidics** CINDY K. HARNETT, THOMAS M. LUCAS, JULIA W. AEBERSOLD, University of Louisville — Capillary forces at the air-water interface are widely regarded as a nuisance in fabricating micro- and nanoelectromechanical (MEMS/NEMS) devices, since the forces can pull suspended cantilevers permanently to the substrate. However, this phenomenon leads to interesting and potentially useful behavior with highly strained three-dimensional metal/oxide microcoils that can balance the capillary forces. These out-of-plane coiled filaments have typical curvature radii of 100 microns, but the fabrication technique scales from sub-10 nm to more than 1mm. Hydrophobic and hydrophilic self-assembled monolayers (SAMs), applied selectively to metal and oxide surfaces, enable fine control over the wettability of these structures. The resulting microcages and microtubes can contain nonpolar fluids (air, oils) in a polar fluid, or vice versa. Applications include controlled bubble capture for dry sample storage, quantification of the reaction rate of electrolytic reactions by detection of gas bubbles exceeding a threshold size, and confinement of liquids in porous microcontainers that enable diffusion of gaseous reactants.

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Date submitted: 20 Nov 2009 Electronic form version 1.4