

Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

An arrayed nanocavity structure for novel spectroscopic chem/bio-sensing¹ H.Z. ZHAO, L. REN, T. KIRKPATRICK, B. RIZAL, R. DURNING, Z.F. REN, M.J. NAUGHTON, T.C. CHILES, D. CAI², Boston College — Chemical sensors based on coaxial nanocavity arrays are demonstrated. The high throughput array is developed by overlaying porous Al₂O₃ and Al layers on vertically aligned carbon nanotube arrays. Adsorption of molecules, such as vapors of water, methanol and ethanol, into the porous Al₂O₃ layer (the cavity) changes the dielectric properties of the device and leads to detectable changes in the capacitance/impedance of the nanocoax sensor. The detections were conducted in both time and frequency domains with impedance spectroscopy (1Hz-1MHz). Different chemicals exhibited different dose responses and response dynamics. A potentially characteristic 14 kHz shift of peak frequencies was observed between the spectra of acetone and ethanol. This demonstrates the concept of spectroscopic chemical sensing using high density arrays of vertical nanocavity structures. Such techniques will also be applied to biological sensing.

¹We thank the Dept. of the Navy, NSF and the Seaver Institute for support.

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Date submitted: 01 Dec 2009

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