Abstract Submitted
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Microelectromechanical Systems (MEMS) for Tunable Plasmon Coupling THOMAS STARK, MATTHIAS IMBODEN, SABRI KAYA, SHYAMSUNDER ERRAMILLI, AHMET YILMAZ, ALKET MERTIRI, JACKSON CHANG, DAVID BISHOP, SELIM UNLU, Boston University — The plasmonic response of metallic nanoparticles depends upon the particle composition, size, shape, surrounding medium, and electromagnetic field coupling to neighboring particles. We present schemes for using MEMS to tune the separation of plasmonic elements and thereby alter the plasmonic response. One of our devices can move two nanoparticles along three axes, creating a dimer with a tunable separation. Localized surface plasmon resonances are sensitive to changes in the surrounding dielectric medium, a phenomenon that has been used in sensing applications [1]. We will use the dimer as a tunable sensor by scanning it through a region of interest and extrapolating changes in the local dielectric properties from the shift in the plasmonic resonance. Another MEMS device actuates arrays of micron-sized gold antennas relative to one another. Changing the separation between elements in an array of plasmonic particles can lead to electromagnetically induced transparency (EIT) and absorption (EIA) [2]. We will shift the arrays relative to one another and measure the spectral response using Fourier transform infrared spectroscopy to demonstrate EIT and EIA. [1] Mock, J., Et al. Nano Lett. 3 (4), 485-491 (2003). [2] Adato, R., et. al., Nano Lett. 13 (6), 2584-2591 (2013).

Thomas Stark
Boston University

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