Abstract Submitted
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Near-field spatial mapping of strongly interacting multiple plasmonic infrared antennas[1] YOHANNES ABATE, Georgia State University — Near-field dipolar plasmon interactions of multiple infrared antenna structures in the strong coupling limit are studied using scattering-type scanning near-field optical microscope (s-SNOM) and theoretical finite-difference time-domain (FDTD) calculations. We monitor in real-space the evolution of plasmon dipolar mode of a stationary antenna structure as multiple resonantly matched dipolar plasmon particles are closely approaching it. Interparticle separation, length and polarization dependent studies show that the cross geometry structure favors strong interparticle charge–charge, dipole–dipole and charge–dipole Coulomb interactions in the nanometer scale gap region, which results in strong field enhancement in cross-bowties and further allows these structures to be used as polarization filters. The nanoscale local field amplitude and phase maps show that due to strong interparticle Coulomb coupling, cross-bowtie structures redistribute and highly enhance the out-of-plane (perpendicular to the plane of the sample) plasmon near-field component at the gap region relative to ordinary bowties. Preliminary results on using VO_2 film to tune infrared plasmonic antenna resonances will be presented.

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