MAR14-2013-020170

Abstract for an Invited Paper
for the MAR14 Meeting of
the American Physical Society

Frank Isakson Prize: Coherent Plasmonics

NAOMI HALAS, Rice University

Metallic nanostructures generally give rise to both bright and dark plasmon modes, and through these modes and their interactions can support a variety of coherent phenomena more typically associated with atomic systems. The coupling between superradiant and subradiant plasmons can give rise to Fano resonances and electromagnetically induced transparency, for example. In plasmonic nanostructures, these properties can be systematically controlled through geometry, providing strategies for designing and engineering resonant lineshapes based on these interactions. Fano resonances can also selectively enhance the coupling between coherent optical sources, giving rise to a new class of nonlinear optical media tailored to enhance specific processes such as four-wave mixing and coherent anti-Stokes Raman scattering. Coherent interactions can be extended to the coupling of plasmon resonances to the vibronic states of molecules and extended disordered media. Spontaneous emission rates of molecules can also be manipulated by resonant and near-resonant proximal coherent plasmonic nanostructures.