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Abstract for an Invited Paper  
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**Multiphoton Photoemission/Velocity Map Imaging Studies of Single Particle Plasmonics: A New  
Ultrafast Laser Microscopy Tool for Nanomaterials**

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The ability to look with ultrafast laser microscopy at nanoparticles has led to an explosion of novel research opportunities in chemistry, physics and engineering. By way of example, this talk will attempt to present recent “vignettes” from our group in ultrafast photoelectron studies of novel plasmonic nanomaterials. In particular, scanning photoionization microscopy (SPIM) and dynamics of Au, Ag plasmonic rods, cubes, nanoshells, nanostars, etc) have been investigated at the single nanoparticle level, exploiting ultrafast laser pulses tuned over the nanoparticle plasmon resonance features and monitored by time-resolved, coherent multiphoton electron photoemission and velocity map imaging methods. The focus will be on simple physical pictures that help explain and interpret the underlying chemical physics on the nanoscale level.

In collaboration with Andrej Grubisic, NASA and Jacob Pettine, JILA, University of Colorado.