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**Imaging of Surface Plasmons by Ultrafast Multi-Photon Photoemission Electron Microscopy** YANAN DAI, MACIEJ DABROWKI, HRVOJE PETEK, Department of Physics and Astronomy, University of Pittsburgh, Pittsburgh, PA 15260 — Silver nanostructures on silicon substrates are characterized by Low Energy Electron Microscopy (LEEM) and their plasmonic modes are imaged by ultrafast femtosecond laser pulse with Multi-Photon Photoemission Electron Microscopy (mP-PEEM). Simulations of Surface Plasmon Polariton (SPP) and Localized Surface Plasmon (LSP) mP-PEEM images are performed by 3D finite difference time domain (FDTD) method in order to characterize the plasmonic excitations. We imaged and simulated the interference patterns of multiple SPPs launched at the edges of microns scale single-crystal Ag islands with excitation wavelengths covering whole visible range. In addition, we studied the plasmonically enhanced excitation and plasmonic field distributions on single-crystal Ag wires of a few microns in length. Finally, we studied plasmon dynamics by recording plasmon field evolution on Ag structures from FDTD simulation.

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