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Ultrafast Coherent Nanoscopy and Control of Plasmonic Nanostructures DMITRI VORONINE, CHARLES BALLMANN, ALEXEI SOKOLOV, Texas A&M University — Space-time-resolved nonlinear optical spectroscopy with nanoscale spatial and femtosecond temporal resolution may provide structural and dynamical information of various ultrafast processes such as energy and electron transfer, protein folding, etc. Theoretical analysis of tip-enhanced coherent anti-Stokes Raman scattering (TECARS) using a new plasmonic nanostructure is presented. Two tips are used to provide near-field enhancement and control of the nanoantenna response. TECARS signals from different hot spots are obtained by laser pulse shaping and tip manipulation. Various applications of time-resolved surface-enhanced coherent Raman spectroscopy and strategies for manipulating the spectra are discussed.

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