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**Manipulating Surface Plasmons at Nanoscales for Enhancing Raman Scattering** Q.-H. WEI, J. GU, C.F. CHOU, F. ZENHAUSERN, CENTER FOR APPLIED NANOBIOSCIENCE, BIODESIGN INSTITUTE, ARIZONA STATE UNIVERSITY, TEMPE, AZ85287 TEAM — The excitation of surface plasmon resonances (SP) of noble metal nanoparticles and nanostructures results in extraordinary scattering at resonant wavelengths and local field enhancement at certain nano "hotspots." Especially, when molecules are attached to these nano hotspots, the Raman signals of these molecules can be significantly enhanced, a phenomenon called surface-enhanced Raman scattering (SERS). Recent experiments revealed that at certain conditions, the Raman enhancement factor can reach 12 orders, allowing for single molecule detection. While large scale practical applications of SERS for biomolecular sensing have been prohibited by the poor reproducibility and controllability of SERS active substrates, this paper will report our recent efforts on manipulating surface plasmons on nanostructures such as nanoparticle arrays (1D and 2D), and nanotip arrays. Both experimental and numerical data will be reported on surface plasmons and SERS on these nanostructures.

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