

Abstract Submitted
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Electrostatic gating and single-molecule Raman spectroscopy YA-JING LI, PAVLO ZOLOTAVIN, Department of Physics and Astronomy, Rice Univ, DOUGLAS NATELSON, Department of Physics and Astronomy, Rice Univ — Simultaneous electronic and optical measurement on molecular junctions provide rich microscopic information about electronic and vibrational energy distributions at the atomic and molecular scale. We fabricate nanoscale gold bowtie structures as surface enhanced Raman (SERS) substrates. Following electromigration, these nanostructure with nanoscale interelectrode gaps support highly localized surface plasmon resonances, resulting in single-molecule sensitivity due to the high electromagnetic enhancement. In prior electronic transport studies, these structures have proven to be suitable tools to examine electronic and vibrational properties of single molecules, in which the underlying substrate is used as a gate electrode to capacitively shift the molecular level relative to the Fermi levels of the source and drain, enabling the studies in the nonresonant, resonant and Coulomb blockade regime. We will present preliminary results on the effect of gate modulation on the SERS and electrical properties of molecules in such junctions.

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