Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Remote heating in Au bowtie constrictions by propagating plasmons[1] CHARLOTTE EVANS, PAVLO ZOLOTAVIN, ALESSANDRO ALABASTRI, PETER NORDLANDER, DOUGLAS NATELSON, Department of Physics and Astronomy - Rice University — Gold bowtie nanowires attached to larger electrodes are convenient devices for combining electronic and optical measurements, because they can be modified to form plasmonically-active junctions that serve as surface-enhanced Raman scattering (SERS) substrates with single-molecule sensitivity. Direct optical excitation of the molecular junction by focused incident laser can cause a dramatic temperature increase in the metal, resulting in molecular configuration instability and breakdown. Adding metallic gratings to the electrodes of these devices allows for remote excitation of the junction. By shining light on the gratings, propagating plasmon modes travel to and remotely excite the junction with far less heating than direct excitation. These plasmons have propagation lengths over 10 microns and decrease the overall heating of the junction by over 70% as measured with a bolometric detection method. We will discuss how this simple addition to the electrode design allows for reliable remote heating of the constriction via plasmon propagation and its potential use in low-temperature, single-molecule SERS measurements.

[1]NSF GRFP DGE-1450681 and ARO award W911 NF-13-1-0476

Charlotte Evans
Department of Physics and Astronomy - Rice University

Date submitted: 13 Apr 2017 Electronic form version 1.4