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Study of Raman Stark Effect in Self-Aligned Nanojunctions JOSEPH HERZOG, Rice University, DANIEL WARD, University of Wisconsin, DOUGLAS NATELSON, Rice University — Plasmonically-active nanojunctions have been used to study the electrical and optical properties of single molecules by using surface-enhanced Raman spectroscopy (SERS). A new, "self-aligned" fabrication technique has been developed to mass-produce more robust nanojunctions. Similar to nanogaps made by electromigration, these self-aligned nanojunctions have been shown to exhibit strong SERS signal. In addition to having the capabilities of fabricating SERS substrates on a massive scale, the self-aligned technique also produces devices with a longer shelf-life than those fabricated by electromigration. Preliminary studies of the electomigrated devices have demonstrated Raman Stark shifts under DC bias. This work aims to study the Stark effect more in-depth and with the self-aligned nanogaps geometry by integrating the self-aligned structures into electrical circuits. Initial findings and current progress of these simultaneous optical and electrical measurements of a single molecule's vibrational modes will be discussed.

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