

Abstract Submitted  
for the MAR08 Meeting of  
The American Physical Society

**Simultaneous measurements of single-molecule electrical conduction and Raman response** DANIEL WARD, NAOMI HALAS, DOUGLAS NATELSON, Rice University — Electronic conduction through single molecules is affected by the molecular electronic structure as well as by other information that is extremely difficult to assess, such as bonding geometry and chemical environment. The lack of an independent diagnostic technique has long hampered single-molecule conductance studies. We report on simultaneous measurements of single molecule electronic conduction and Raman response in a nanogap geometry using paramercaptoaniline. The measurements show strong correlations in the time variation of the conductance and the Raman spectrum. The Raman changes include “blinking”, spectral diffusion, and changes in Raman mode structure. Conduction in nanogaps is known to be dominated by a single or at most a few molecules, demonstrating the correlated Raman response is also single molecule in nature. These observations establish that multimodal sensing of individual molecules is possible in these mass-producible nanostructures.

Daniel Ward  
Rice University

Date submitted: 27 Nov 2007

Electronic form version 1.4