

Abstract Submitted
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SERS detection of vibrational Stark effect using PCBM-based molecular junctions YAJING LI, Department of Physics and Astronomy, Rice University, PETER DOAK, Department of Chemistry, University of California, Berkeley, PAVLO ZOLOTAVIN, Department of Physics and Astronomy, Rice University, JEFFREY NEATON, Molecular Foundry, Lawrence Berkeley National Laboratory, LEEOR KRONIK, Department of Materials and Interfaces, Weizmann Institute of Science, DOUGLAS NATELSON, Department of Physics and Astronomy, Rice University — Understanding the interplay of local electric field and vibrational degrees of freedom of molecules are of interest. We fabricate gold bowtie structures with nanometer inter- electrode spacing using controllable electromigration. Those gold nanostructures support highly localized plasmons and have proven to be suitable SERS substrates with single-molecule sensitivity, which enable the study of molecular vibrational and electronic physics. By measuring the Raman emission from the electrically biased PCBM-containing junctions, we observed strong linear shifts on the vibrational energies of PCBM. We will present the experiments as well as preliminary theoretical expectations obtained by DFT calculations. We compare the field driven change of vibrational energies of PCBM with those observed in C60 junctions, which have been reported to exhibit quadratic change of vibrational energies due to bias induced charge variation.

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