

Abstract Submitted  
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**Simultaneous Force and Conductance Measurements of Single Molecule Junctions**<sup>1</sup> MICHAEL FREI, SRIHARSHA ARADHYA, MARK S. HYBERTSEN, LATHA VENKATARAMAN, Columbia University and CFN, Brookhaven National Laboratory — We present simultaneous conductance and breaking force measurements of single molecular junctions formed using a modified conductive atomic force microscope. Breaking forces are determined for large data sets of over 10000 measurements and the data is analyzed using a novel approach which allows an unbiased and statistically significant determination of single bond-breaking forces. We confirm our experimental setup and analysis techniques by a comparison of the determined single Au-Au bond breaking force to the accepted experimental and theoretical value from literature. We then apply the same method to study the breaking forces for molecular junctions bonded with amine, methylsulfide and pyridine linkers, which form donor-acceptor bonds with under-coordinated Au atoms. We find that the molecule breaking force depends both on the linker as well as its chemical nature. Comparison to the Au-Au breaking force allows the conclusion that for each molecule studied the junctions break at the N-Au and S-Au bond as is expected from theoretical calculations.

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