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Single Molecule Junctions: Conductance, Formation and Persistence Statistics. MARIA KAMENETSKA, Department of Applied Physics and Applied Math, Columbia University, MICHAEL FREI, MARK HYBERTSEN, CFN, Brookhaven National Laboratory, LATHA VENKATARAMAN — We measure the conductance of single molecules attached to gold electrodes by repeatedly forming and breaking Au point contacts with a modified STM in a solution of molecules. Conductance traces measured while pulling the point-contacts reveal steps due to the formation of single molecule junctions which can be elongated without a significant change in junction conductance. To better understand the mechanical stability of these single molecule junctions, we analyze data sets of 20000 or more individual conductance traces for a series of diamine molecules, measuring the distance over which junctions can persist. We find that the distance that a junction can be pulled is affected by the metal-molecule binding energy. In addition, we see an unambiguous relationship between geometry and stability, where both the length of the molecule as well as the atomic configuration of the contact electrode affect the distance over which a junction can persist.

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