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Single Molecule Conductance and Contact Chemistry LATHA VENKATARAMAN, YOUNG PARK, ADAM WHALLEY, MASHA KAMENETSKA, MICHAEL STEIGERWALD, COLIN NUCKOLLS, MARK HYBERTSEN, Columbia University — Our previous experiments probing the conductance of single molecule circuits with amine-gold linkages have demonstrated the relationship between the electrical characteristics and the intrinsic molecular properties such as their length, conformation, gap between the highest occupied and lowest unoccupied molecular orbitals and the alignment of these levels to the metal Fermi level. Here we study different chemical linker groups expected to form donor-acceptor bonds to gold. We measure transport through single molecule junctions by repeatedly forming and breaking Au point contacts with a modified STM in a solution of the molecules terminated by Amine, Dimethyl Phosphine and Methyl Sulfide linker groups. The clear molecular signatures allow us to demonstrate a systematic dependence the link group.

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