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Highly Conducting Contacts for Single Molecule Transport Measured by STM-Break Junction[1] JONATHAN R. WIDAWSKY, ZHAN-LING CHENG, RACHID SKOUTA, SEVERIN T. SCHNEEBELI, HECTOR VAZQUEZ, MARK S. HYBERTSEN, RONALD BRESLOW, LATHA VENKATARAMAN, Columbia University and CFN, Brookhaven National Laboratory — We present a novel method to directly link single alkane chains to gold electrodes using trimethyl tin ($SnMe_3$) linkers. We characterize electron transport through single molecule junctions using the STM-based break-junction technique, where a gold point contact is repeatedly formed and broken in a solution of the $SnMe_3$-alkanes while conductance is measured. Based on analysis of more than 10,000 individual junctions, we find that we create single molecule junctions which are ∼100 times more conducting than those with alkanes terminated with any other linker previously studied. The contact resistance, determined by extrapolating to zero carbons, is 4kΩ, two orders of magnitude lower than analogous values found using amine linkers. Strong evidence supports the hypothesis that *in situ* cleaving of the $SnMe_3$ end groups facilitates the formation of a direct bond between the carbon backbone and gold leads, thereby enhancing conductance. We corroborate this result by comparing the conductance of junctions formed from SnMe3- and Ph_3PAu-terminated benzenes.

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