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Molecular conductance measurements through printed Au nanodots. WEIRONG JIANG, Rutgers University, NIKOLAI ZHITENEV, Bell Laboratories, Lucent Technologies, ZHENAN BAO, Standford University, DAVID ABUSCH-MAGDER, Bell Laboratories, Lucent Technologies, DON TENNANT, Bell Laboratories, Lucent Technologies, ERIC GARFUNKEL, Rutgers University
— Gold pads with ∼100 nm diameter are imprinted on self-assembled monolayers of alkane dithiols of different lengths using nano-transfer technique. The fabrication technique ensures formation of chemical bonds at both ends of molecules while minimizes defect creations compared to other metallization methods. The pads are contacted by conductive atomic force microscope (CAFM) to study electron transport through the SAM as a function of contact force. We found that atomic scale topography at the metal-molecules interface is essential to describe the conductance-stress relationship. In as-fabricated devices, only small percentage of molecules (below 1%) is wired to both contacts. A finite force (1-10 nN) deforms devices resulting in two competing effects: (a) contacting larger number of molecules leading; (b) deforming interfacial bonds and/or tilting the molecules. The estimated conductance of molecules is significantly smaller than in previous CAFM experiments and calculations.

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