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Solvent Effects on the Conductance of 1,4-benzenediamine[1]
VALLA FATEMI, MARIA KAMENETSKA, Columbia University, JEFFREY NEATON, Lawrence Berkeley National Lab, LATHA VENKATARAMAN, Columbia University — We measured the conductance of 1,4-benzenediamine (BDA) by mechanically forming and breaking Au point contacts with a modified STM in a solution of molecules in ambient conditions, using a variety of solvents. Here, we present reliable experimental results which show that the conductance of BDA can be increased by over 50% when dissolved in aromatic organic solvents solely by varying halogen groups on the solvent molecule. The trends in conductance do not correlate with the solvent dielectric constant, dipole moment, or direct solvent-BDA interactions. First-principles density functional theory calculations of solvent molecule binding to gold surfaces are used to discuss mechanisms behind the conductance shift of the BDA molecule.

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