Abstract Submitted
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Variation in the Single-Molecule Conductance of Oligothiophenes[1] BRIAN CAPOZZI, EMMA DELL, KATERI DUBAY, JOSE MORENO, TIMOTHY BERKELBACH, DAVID REICHMAN, LUIS CAMPOS, LATHA VENKATARAMAN, Columbia University — Thiophenes are ubiquitous in organic electronic and photovoltaic applications; yet, they have received minimal attention in single molecule transport studies. Here, we carry out single molecule conductance measurements on a family of methyl sulfide-terminated oligothiophenes using the scanning tunneling microscope based break-junction technique. We find a non-exponential decay in conductance with the number of thiophene units (2 through 6) in the chain, which cannot be explained by a simple tunneling or hopping mechanism. We also find that the oligothiophenes exhibit a rather broad conductance distribution when compared to oligophenyls. Using a combination of experiment and molecular dynamics simulations, we show that this increased breadth is most likely due to different thiophene confomers sampled in the experiments, which do not necessarily maintain conjugation along the backbone. These measurements therefore reinforce the importance of conformation and conjugation effects in thiophene-based organic electronic devices where highly conducting molecular components are required.

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