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Single Molecule Circuits for Organic Electronics

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ABSTRACT

There is an increased interest in understanding electron transfer across single molecule junctions and metal/organic interfaces as this has implications in the field of organic electronics and photovoltaics. Single molecule devices offer an ideal test bed for probing charge transfer details at these interfaces. Results from these single-molecule measurements can be directly related directly theoretical models, unlike measurements at the ensemble level. The ability to fabricate single molecule devices and probe electron transfer reliably and reproducibly has enabled us to study and model transport through them.

In this poster, I will review the scanning tunneling microscope break-junction technique we use to measure electronic transport through single molecule junctions [1], and present results from both transport and mechanical measurements using novel metal-molecule link [2]. I will also show how a mechanically controlled binary single molecule switch can be created using bipyridine molecules [3]. I will then present results from atomic force microscope technique used to measure bond rupture forces across single molecule junctions [4].

References:

[1] L. Venkataraman et al., *Nature* **442**, 904 (2006)

[2] Y. S. Park et al., *J. Am. Chem. Soc.* **129**, 15768 (2007)

[3] S. Y. Quek et al., *Nat. Nanotechnol.* **4**, 230 (2009)

[4] M. Frei et al., *Nano Lett.* **11**, 1518 (2011)