

Abstract for an Invited Paper  
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### **Medium Effects in Single Molecule Electronics<sup>1</sup>**

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We use STM-based techniques for measuring the electrical properties of metal|molecule|metal junctions. For a family of molecules  $\text{HS}(\text{CH}_2)_6\text{-Ar}-(\text{CH}_2)_6\text{SH}$  (Ar = substituted benzene), we found that the single molecule conductances varied significantly with substituent, being higher for electron-donating substituents [1]. Later, we studied the effect of increasing conjugation on this system by examining oligothiophenes  $\text{HS}(\text{CH}_2)_6\text{-[C}_4\text{H}_4\text{S]}_x\text{-(CH}_2)_6\text{SH}$  ( $x = 1, 2, 3, 5$ ). We found that the conductances of junctions involving these molecules depended upon the medium in which the measurements were made. In fact, for  $x = 3$ , the conductance was two orders of magnitude higher in the presence of water than in anhydrous conditions [2]. This presentation will outline these studies, together with the results of transport calculations that rationalise these unusual findings, and will set the results in the context of existing literature on medium effects in single molecule conductance determinations. In collaboration with Edmund Leary and Richard Nichols, University of Liverpool; Colin Lambert, Iain Grace, and Chris Finch, University of Lancaster; and Wolfgang Haiss, University of Liverpool.

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