Break Junctions In Liquid For Molecular Electronics

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Molecular electronics is attracting a growing attention today. On the one hand this is due to the recognition that molecules offer unprecedented precision down to single atoms, and on the other hand due to the sophisticated tools of nanoscience and technology which is penetrating into the molecular size regime.

In the present talk, I will present results on electrical transport measurements on single molecular junctions. In particular, we use a mechanical controllable break junction setup to electrically contact the target molecule between two metallic (gold) leads. The molecular junctions are established and studied in liquid environment, which open the door for electrochemical gating as a way to tune the electrical properties of the molecular junction. The behavior of bare junctions was first characterized in different solvents [1], and, in particular, the importance of the solvent on the properties of junctions containing fullerene derivatives will be shown [2]. This technique requires a statistical approach to obtain reliable measurements. The importance of a proper interpretation of features exhibited by the conductance traces measured will be discussed in the base of results for alkanedithiols.

[1] Conductance of atomic contacts in liquid environment, L. Grüter, M. T. González, R. Hueber, M. Calame, C. Schönenberger, *Small* **1** 1067 (2005).
[2] Resonant tunnelling through a C60 molecular junction in a liquid environment, L. Grüter, F. Cheng, T. T. Heikkilä, M. T. González, F. Diederich, C. Schönenberger, M. Calame, *Nanotechnology* **16** 2143 (2005).