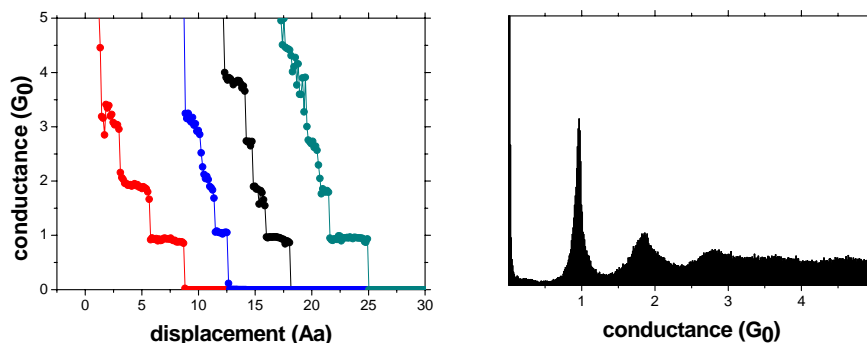


MEASURING THE CONDUCTANCE OF MOLECULAR JUNCTIONS

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As a clean gold contact breaks its conductance decreases stepwise. The conductance of the last step is typically $G_0=2e^2/h$, the so-called quantum of conductance, indicating that the contact consists of only one atom or single atomic chain. After rupture the conductance decreases exponentially which is the signature of tunneling. As a consequence a conductance histogram shows a prominent peak at G_0 [1].

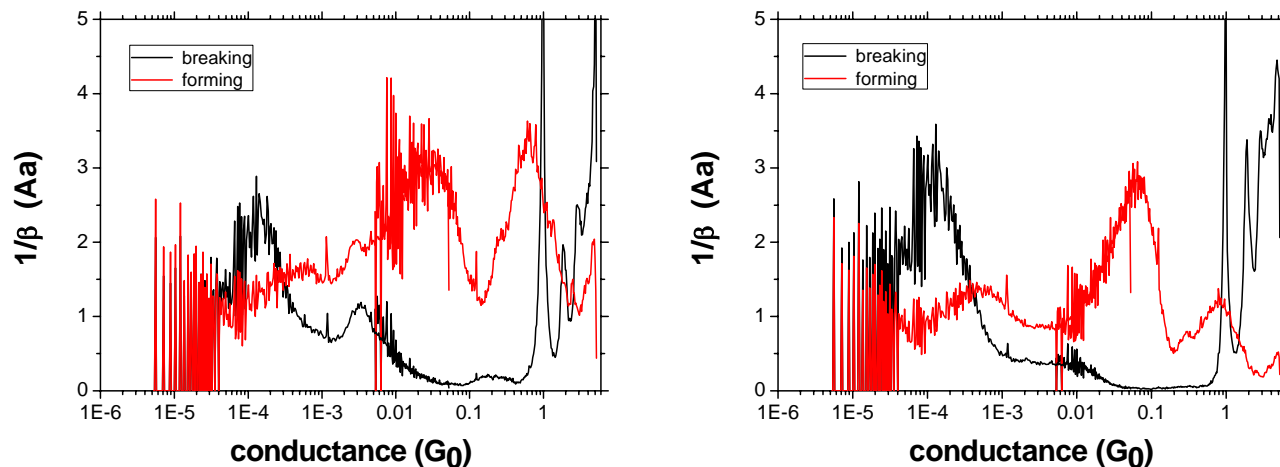
In contrast, when a gold contact is broken within a molecular solution, additional conductance steps at values lower than G_0 appear. The corresponding peaks in the conductance histograms have been associated with the conductance of a single molecule bridging the gap between the electrodes [2].



Variation of conductance during the breaking process of gold point contact in absence of molecules and conductance histogram constructed from 5000 traces.

We have measured the conductance of several molecules in solution at room temperature using a scanning tunnelling microscope (STM). Our setup has been modified to allow for the measurement of the conductance continuously spanning 6 decades in contrast to the conventional 4 decades. This facilitates the control of the pulling process and the range of conductance that it is possible to measure. In addition we have developed a convenient analysis method in terms of the *average tunneling exponent* as an alternative to the conventional conductance histograms.

Our results are in good agreement with recent results [3,4].



New representation of conductance histograms constructed from 11000 consecutive traces measured in presence of 1,3 propanodiamine on the left and in pure solvent on the right. Note the peak in $3E-3 G_0$.

References:

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