

CONDUCTANCE IN GOLD MONOATOMIC WIRES CONTAINING OXYGEN AND CARBON IMPURITIES

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Some important aspects of the experiments in atomic-sized gold nanowires are still controversial [1, 2, 3]. The main reason is that different procedures are followed to obtain the samples in which different kinds of measurements are performed. Conductance measurements (which consistently find values very close to the quantum of conductance $G_0=2e^2/h$) are done in wires obtained in mechanically controllable break junctions. In these samples, the atomic distances are not directly measured, but can be estimated using indirect approaches to be around 2.5 Å, in good agreement with theoretical predictions [4]. On the other hand, direct visualization by TEM is possible in samples obtained by electron beam drilling in thin films, where unusually long distances are often observed. Several explanations for these long distances have even presented to date [2, 5, 6], and some of them involve the presence of light impurities such as O or C in the gold chain.

Here, we consider the issue whether the presence of these impurities affects the transport properties of the gold wires. Our results show that the conductance changes dramatically in the presence of impurities [7], which lead us to propose that transport measurements could be a way to verify experimentally the presence of impurities in atomic gold wires.

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