Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Ballistic transport in gold [110] nanowire YOSHIHIKO KURUI, YOSHIFUMI OSHIMA, Tokyo Institute of Technology, MASAKUNI OKAMOTO, Hitachi Ltd, KUNIO TAKAYANAGI, Tokyo Institute of Technology — Conductance of gold nanowire elongated along the [110] direction (gold [110] nanowire) was measured during many breaking procedures, while simultaneously acquiring transmission electron microscope images. The conductance histogram exhibits a series of peaks whose conductance values increased nearly in steps of the conductance quantum, G0 $=2e^2/h$. However thick nanowires above $10G_0$ showed dequantization, where the increment was only $0.9G_0$. The structure for each peak was determined to be either an atomic sheet or a hexagonal prism. The number of conductance channels calculated for each atomic structure by first principles theory, coincided well with the peak index in the conductance histogram. The present study shows that the [110] nanowire behave as ballistic conductors, and a conductance peak appears whenever a conductance channel is opened.

Yoshihiko Kurui
Tokyo Institute of Technology

Date submitted: 30 Nov 2008 Electronic form version 1.4