Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Correlated study of individual nanowires with electronic transport and scanning tunneling microscopy SHENGYONG QIN, TAE-HWAN KIM, Oak Ridge National Laboratory, YANNING ZHANG, University of California, Irvine, HANNO H. WEITERING, The University of Tennessee, Knoxville, CHIH-KANG SHIH, The University of Texas at Austin, WENJIE OUYANG, RUQIAN WU, University of California, Irvine, ARTHUR P. BADDORF, AN-PING LI, Oak Ridge National Laboratory — The electronic conductance in quantum wires is often dictated by quantum instabilities and strong localization at the atomic scale. We present a novel nano-transport technique which combines local nano-contacts and four-probe STM. The approach allows for correlated study of electron transport and scanning tunneling spectroscopy in individual nanowires. We first apply it to the GdSi2 quantum wires, which show that isolated nanowires exhibit a metal-insulator transition upon cooling, driven by the defect-induced localizations, while wire bundles maintain a robust metallic state, stabilized by interwire electronic coupling. We then demonstrate applications of this transport technique with cabon nanotubes and copper wires in situ. The method bridges the gap between the transport and the local electronic and structural properties down to the atomic scale.

Shengyong Qin
Oak Ridge National Laboratory

Date submitted: 11 Nov 2011 Electronic form version 1.4