Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Nanoscale Molecular-Electronic Device Fabrication enabling Complete Chemical and Physical Characterization JASON J. BLACKSTOCK, Quantum Science Research, HP Labs, DUNCAN T. STEWART, Quantum Science Research, HP Labs, CARRIE L. DONLEY, Quantum Science Research, HP Labs, R. STANLEY WILLIAMS, Quantum Science Research, HP Labs
— The limitation of most nanoscale molecular-electronic devices is the lack of physical/chemical characterization accompanying electrical data. Such characterization is typically impossible, because the critical layers and interfaces being inaccessibly buried in the final device structure. We present new fabrication techniques that enable a range of conventional characterization tools to be employed during and after nanoscale device fabrication. These techniques include: the fabrication of atomically-flat, patterned template-stripped bottom metal electrodes with well-defined atomic structure (elucidated by UHV-STM); and the formation of a new stencil-based nanopore device geometry enabling detailed characterization of the internal nanoscale physical/chemical properties of the final devices. The combination of these techniques allows for molecular-electronic devices with lateral sizes ranging from tens of nanometers to hundreds of microns. The fabrication, characterization and electrical properties of metal/molecular-monolayer/metal devices using these techniques (including UHV-STM, AFM, SEM, XPS and IR data) will be presented.

Jason J. Blackstock
Quantum Science Research, HP Labs

Date submitted: 19 Dec 2005 Electronic form version 1.4