

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

High Quality Nanogap Electrodes for Electronic Transport Measurements of Single Molecules DANVERS E. JOHNSTON, DOUGLAS R. STRACHAN, BETH S. GUITON, PETER K. DAVIES, TAE HONG PARK, MICHAEL J. THERIEN, A. T. CHARLIE JOHNSON, University of Pennsylvania — Electromigrated metal electrodes and resulting devices have shown great promise in moving towards the realization of single molecule-based electronic devices holding the potential for a wide range of electronic applications. At present, a major concern is that the electronic behavior of such devices may be greatly influenced by residual nanoscale metal particles. We have developed a computer controlled electromigration (CCE) process for creating nanogaps at room temperature which allows us to characterize a bare nanogap before putting a molecule into the nanogap.¹ This is very different from other approaches used in the field where nanogaps are formed at low temperature with molecules already attached to the nanowire by employing a simple ramp up in voltage. Among the bare nanogaps we produced using CCE, tunneling behavior is observed with no indication of transport signatures associated with metal particle formation. Details of molecular measurements utilizing these clean gaps will be discussed. This work was supported by the National Science Foundation (NIRT Grant No. 0304531 and MRSEC award DMR05-20020). ¹D. R. Strachan, D. E. Smith, D. E. Johnston et al., *Appl. Phys. Lett.* **86** 043109 (2005).

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Date submitted: 20 Nov 2006

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