Abstract Submitted
for the TSS13 Meeting of
The American Physical Society

DNA in Nanoscale Electronics JASON SLINKER, CHRIS WOHLGAMUTH, MARC MCWILLIAMS, ALON GORODETSKY, The University of Texas at Dallas — DNA, the quintessential molecule of life, possesses a number of attractive properties for use in nanoscale circuits. Charge transport (CT) through DNA itself is of both fundamental and practical interest. Fundamentally, DNA has a unique configuration of π-stacked bases in a well ordered, double helical structure. Given its unparalleled importance to life processes and its arrangement of conjugated subunits, DNA has been a compelling target of conductivity studies. In addition, further understanding of DNA CT will elucidate the biological implications of this process and advance its use in sensing technologies. We have investigated the fundamentals of DNA CT by measuring the electrochemistry of DNA monolayers under biologically-relevant conditions. We have uncovered both fundamental kinetic parameters to distinguish between competing models of operation as well as the practical implications of DNA CT for sensing. Furthermore, we are leveraging our studies of DNA conductivity for the manufacture of nanoscale circuits. We are investigating the electrical properties and self-assembly of DNA nanowires containing artificial base pair surrogates, which can be prepared through low cost and high throughput automated DNA synthesis. This unique and economically viable approach will establish a new paradigm for the scalable manufacture of nanoscale semiconductor devices.

Jason Slinker
The University of Texas at Dallas

Date submitted: 27 Feb 2013 Electronic form version 1.4