Abstract Submitted
for the TSS13 Meeting of
The American Physical Society

Temperature Dependent DNA Charge Transport CHRIS WOHLGAMUTH, MARC MCWILLIAMS, JASON SLINKER, The University of Texas at Dallas — Charge transport (CT) through DNA has been extensively studied, and yet the mechanism of this process is still not yet fully understood. DNA CT has been utilized in sensing proteins and DNA fragments, it has been postulated that it may assist DNA damage prevention and repair, and further understanding of this process will elucidate the biological implications of DNA CT and advance sensing technology. Therefore, we have investigated the temperature dependence of DNA CT by measuring the electrochemistry of DNA monolayers modified with a redox-active probe. We compare square wave voltammetry of distinct DNA sequences under identical experimental conditions. Accordingly, we compare well matched DNA duplexes to those containing a single base pair mismatch. Additionally, we vary the probe location within the well matched DNA duplex in order to investigate distance dependent kinetics. Furthermore, a comparison of an A-T rich and G-C rich duplex is performed. Using a model put forth by O'Dea and Osteryoung and applying a nonlinear least squares analysis we are able to determine the charge transport rates (k), transport coefficients (α), and the active surface concentration (Γ^*) of the DNA monolayer. The transport rates of CT are shown to follow Arrhenius behavior.

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Date submitted: 28 Feb 2013 Electronic form version 1.4