Abstract Submitted
for the TSF12 Meeting of
The American Physical Society

Temperature Dependent Kinetics 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. Besides the benefits of understanding charge transport through this fundamental molecule, 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. By using multiplexed electrodes on silicon chips, we compare square wave voltammetry of distinct DNA sequences under identical experimental conditions. We vary the probe length within the well matched DNA duplex in order to investigate distance dependent kinetics. This length dependent study is a necessary step to understanding the dominant mechanism behind DNA CT. Using a model put forth by O'Dea and Osteryoung and applying a nonlinear least squares analysis we are able to determine the charge transfer rates (k), transfer coefficients (α), and the total surface concentration (Γ^*) of the DNA monolayer. Arrhenius like behavior is observed for the multiple probe locations, and the results are viewed in light of and compared to the prominent charge transport mechanisms.

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Date submitted: 10 Sep 2012 Electronic form version 1.4