Long-Term Viability of DNA-Based Bionanoelectronics:
Studies in Transient Effects on Electrical Property of DNA Molecular Wires

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In this talk, we present recent data from our Lab in the investigation of the long-term electrical characteristics of DNA in new carbon-based bionanoelectronics platform comprising of DNA molecular wires and interconnects attached to carbon microelectrodes where the 3D structure enables suspension of DNA wires away from the substrate eliminating its effect. Key results in the electrical characterization of this 3D carbon electrode-based bionanoelectronics architecture and accelerated testing for exploring long-term viability and stability of this platform are presented.

This study is part of our ongoing research program in the use of DNA-based nanomanufacturing of more complex 3D nanoelectronics components in an environment of constantly varying and extended localized environmental conditions such as salinity, pH, ionic concentrations, current-levels, temperature, hysteresis, and the like. Such electrochemical variations are expected during the self-assembly process (as well as post-fabrication operation) of DNA wires and interconnects. The systematic electrical characterization of such DNA wires/interconnects by varying such external variables coupled with eliminating the effect of the substrate itself could help the understanding of the fundamental mechanism of charge transport in DNA under various experimental conditions.

References