The Quest for Charge Transport in Single Adsorbed Long DNA-Based Molecules

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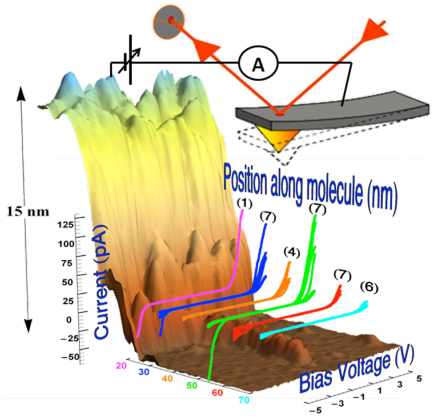
DNA and DNA-based polymers have been at the focus of molecular electronics owing to their programmable structural versatility. The variability in the measured molecules and experimental setups [1-14] has produced a wide range of partial or seemingly contradictory results, highlighting the challenge to transport significant current through individual DNA-based molecules. I will report on detailed and reproducible charge transport measurements in G4-DNA, adsorbed on a mica substrate. Using a special setup for testing molecular conductance in single polymers, we observed currents of tens to over 100 pA in many G4-DNA molecules over distances ranging from tens to over 100 nm, compatible with a long-range thermal hopping between multi-tetrad segments. With this report, we answer a long-standing question about the ability of individual polymers to transport significant current over long distances when adsorbed a hard substrate, and its mechanism. Furthermore, I will report on a new type of selectively metalized DNA. This new type of wire together with the above results may re-ignite the interest in DNA-based wires and devices towards implementing these wires in devices and programmable circuits.



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