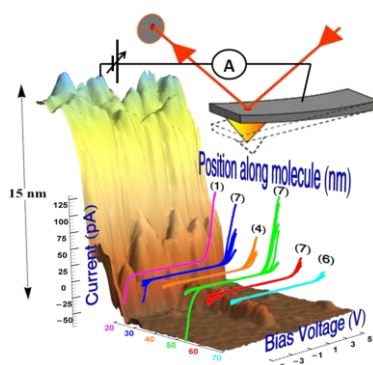


Charge Transport in single DNA-Based Molecules

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DNA has been in the center of the scientific research for decades. In particular, DNA was considered as one of the attractive candidates for molecular electronics and an excellent system to study charge transport in 1-D polymers. In spite of intensive efforts the results varied between experiments due to changes in the measured molecules, measurement methods and environment. Recently we were able to measure length dependent electrical transport in G4-DNA attached to a hard surface in a controlled way and get an insight to the mechanism governing the charge transport in these molecules. I will report on these results and on our measurement efforts with additional methods.

- [1] "Direct measurement of electrical transport through DNA molecules", Danny Porath, Alexey Bezryadin, Simon de Vries and Cees Dekker, **Nature** **403**, 635 (2000).
- [2] "Charge Transport in DNA-based Devices", Danny Porath, Rosa Di Felice and Gianarelio Cuniberti, Topics in Current Chemistry Vol. **237**, pp. 183-228 Ed. Gary Shuster. Springer Verlag 2004.
- [3] "Direct Measurement of Electrical Transport Through Single DNA Molecules of Complex Sequence", Hezy Cohen, Claude Nogues, Ron Naaman and Danny Porath, **PNAS** **102**, 11589 (2005).
- [4] "Long Monomolecular G4-DNA Nanowires", Alexander Kotlyar, Nataly Borovok, Tatiana Molotsky, Hezy Cohen, Errez Shapir and Danny Porath, **Advanced Materials** **17**, 1901 (2005).
- [5] "Electrical characterization of self-assembled single- and double-stranded DNA monolayers using conductive AFM", Hezy Cohen et al., **Faraday Discussions** **131**, 367 (2006).
- [6] "High-Resolution STM Imaging of Novel Poly(G)-Poly(C)DNA Molecules", Errez Shapir, Hezy Cohen, Natalia Borovok, Alexander B. Kotlyar and Danny Porath, **J. Phys. Chem. B** **110**, 4430 (2006).
- [7] "Polarizability of G4-DNA Observed by Electrostatic Force Microscopy Measurements", Hezy Cohen et al., **Nano Letters** **7(4)**, 981 (2007).
- [8] "Electronic structure of single DNA molecules resolved by transverse scanning tunneling spectroscopy", Errez Shapir et al., **Nature Materials** **7**, 68 (2008).
- [9] "A DNA sequence scanned", Danny Porath, **Nature Nanotechnology** **4**, 476 (2009).
- [10] "The Electronic Structure of G4-DNA by Scanning Tunneling Spectroscopy", Errez Shapir, et al., **J. Phys. Chem. C** **114**, 22079 (2010).
- [11] "Energy gap reduction in DNA by complexation with metal ions", Errez Shapir, G. Brancolini, Tatiana Molotsky, Alexander B. Kotlyar, Rosa Di Felice, and Danny Porath, **Advanced Materials** **23**, 4290 (2011).
- [12] "Quasi 3D imaging of DNA-gold nanoparticle tetrahedral structures", Avigail Stern, Dvir Rotem, Inna Popov and Danny Porath, **J. Phys. Cond. Mat.** **24**, 164203 (2012).