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Experimental investigation of the influence of DNA structure on its the charge transport properties V. SOGHOMONIAN, B. HARTZELL, HONG CHEN, J.J. HEREMANS, Ohio University, Department of Physics and Astronomy — We present experimental results demonstrating the influence of DNA structure on its electronic properties. Comparative current-voltage measurements for the random-sequence lambda-DNA and modified lambda-DNA molecules are studied. Modifications include the introduction of various numbers of nicks in the phosphate backbone of a strand, influence of intercalated metal ions, as well as comparative measurements between double and single stranded molecules. In fact, single stranded DNA, or double stranded DNA with a large number of nicks (greater than 3 per molecule), result in current values barely above that of an open device. Moreover, the resulting I-V curve shapes reflect the influence of, and hint at, an integral relationship between the native structure of DNA with its stacked base pairs and the molecule's ability to transport charge. Understanding the charge transport properties of this biomolecule is important if DNA is to be utilized as an electronic material for applications in nanotechnology (NSF DMR 0103034).

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