

Nonlinear charge transport in DNA

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For the detailed understanding of the conduction mechanism in DNA we use models based on the concept of polaron and breather solutions. We describe how charge transport relies on the coupling of the charge carrying unit to vibrational modes of DNA allowing for the formation of polaron-like states. The mobility of these localized states is discussed particularly in the presence of parametrical and structural disorder inherent to biomolecules. It is demonstrated that long-rang coherent charge transport along the DNA backbone structure is supported by mobile polaron and breather solutions, suggesting that DNA seems suitable for the design of functional nanostructures as ingredients in molecular nanoelectronic devices.