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Bio-Polymer Hairpin Loops Sustained by Polarons

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We show that polarons can sustain loop-like configurations in flexible biopolymers and that the size of the loops depend on both the flexural rigidity of the polymer and the electron-phonon coupling constant. In particular we show that for single stranded DNA (ssDNA) such loops can have as little as 10 base pairs. For polyacetylene the shortest loop must have at least 12 nodes. We also show that these configurations are very stable under thermal fluctuations and can facilitate the formation of hairpin-loops of ssDNA.

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