Assembly of G-Quadruplex DNA nanostructure

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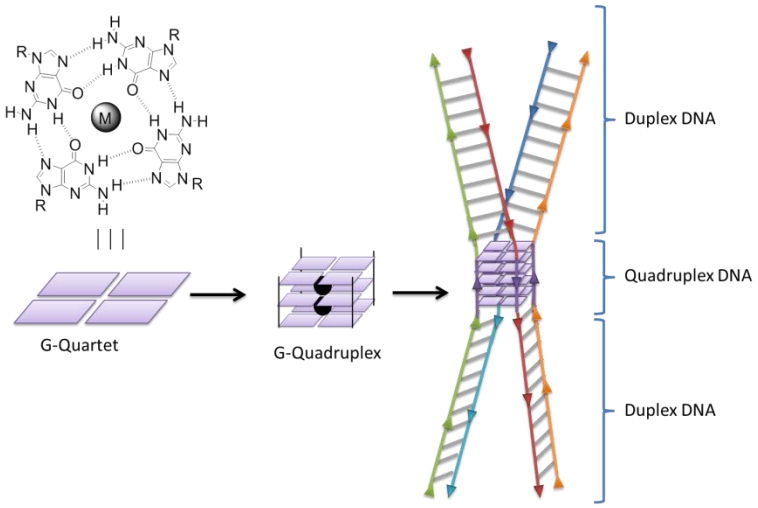
DNA's remarkable molecular recognition and its programmable self-assembly properties have brought this molecule to the materials field.[1] The particular recognition of the base-pare formation allows the construction of supramolecular structures in a nanoscale precision with a large number of potential applications.[2] Appling the well-known W-C base-pair formation is certainly the most common technique for the construction of DNA-nanostructures. However, the construction of nanostructures based on non-canonical DNA structures is gaining importance and nanodevices based on motifs such as quadruplex or triplexes have been described.[3]

G-quadruplexes are a family of nucleic acid structures based on the formation of two or more G-quartets, in which four co-planar guanines establish a cyclic array of H-bonds, further stabilized by the presence of positively charged cations located in the central channel. In comparison to duplex DNA, G-quadruplex motifs are highly polymorphic: they can be formed by one or several DNA strands (intra or intermolecular); DNA strands may show different polarities (parallel, antiparallel or "3+1"); nature of the central cation, etc.

In this report we investigated how duplex DNA and G-quadruplex DNA can be combined to create new supramolecular DNA nanostructures. The programmable self-assembly of WC duplexes was employed to create and orientate G-quadruplex structures in a specific conformation. This induced the synapsable formation of quadruplex structures via duplex-formation.[4,5]



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