Unusual Nucleic Acids for DNA-based nanodevices

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Nucleic acids are finding applications in nanotechnology as nanomaterials, mechanical devices, templates, logic gates and biosensors. G-quadruplex DNA, formed by □-□ stacking of guanine (G) quartets (Figure 1), is an attractive alternative to regular B-DNA because of the kinetic and thermodynamic stability of quadruplexes [1]. However, they suffer from a fatal flaw: the rules of recognition, *i.e.* the formation of a G-quartet in which four *identical* bases are paired, prevent the controlled assembly between different strands leading to complex mixtures. In this report, I will present different solutions to this recognition problem. The proposed design combines two DNA elements: duplexes and a quadruplex core [2]. Duplexes direct controlled assembly of the quadruplex core, and their strands present convenient points of attachments for potential modifiers or DNA origamis [3]. The exceptional stability of the quadruplex core provides integrity to the entire structure which could be used as a building block for nucleic acid-based nanomaterials. Our findings pave the way to broader utilization of G-quadruplex DNA in structural DNA nanomaterials and nanodevices.

Figure 1: Presentation of a G-quartet with four coplanar guanines.

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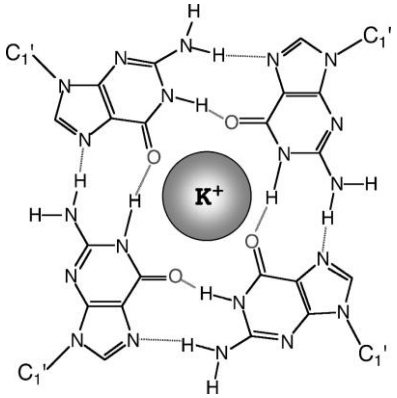

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