Hairpin structures of DNA oligomers investigated by electrochemical and spectral methods

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Abstract

Nowadays, the great attention is devoted to the electrochemical study of DNA and RNA oligomers, forming hairpin or hairpin – like structures in the dependence on the number of bases in the chain.

Hairpins, consisting of single-stranded loop and base – paired stem regions and naturally occuring not only in single-stranded DNAs and RNAs but also in double – stranded DNAs, are very important in many biological processes. They play a crucial role in expansion events of triplet repeat expansion associated with neurodegenerative diseases, such as fragile chromosome X syndrome, Huntington's disease, Friedreich's ataxia or myoclonic epilepsy. The shortest and most stable hairpin is formed by the DNA heptamer d(GCGAAGC). This sequence is found in replication origins of phage ΦX 174 and herpes simplex virus, in a promoter region of an *Escherichia coli* heat-shock gene, and in rRNA genes.

The aim of our contribution is the investigation of DNA heptamers d(GCGAAGC); d(GCCCCGC); d(GCGGGGC); d(GCAAAGC) and d(GCTTTGC) with different trinucleotide sequences in loop using cyclic voltammetry (resp. linear sweep voltammetry) integrated with elimination voltammetry with linear scan (EVLS). The conformational changes of DNA heptamers studied will be confirmed by circular dichroism spectra and UV/VIS thermal denaturation.