

Comparison of Physicochemical Properties of DNA-Ionic Liquids Complexes

Authors : Ewelina Nowak, Anna Wisla-Swider, Gohar Khachatryan, Krzysztof Danel

Abstract : Complexes of ionic liquids with different heterocyclic-rings were synthesized by ion exchange reactions with pure salmon DNA. Ionic liquids (ILs) like 1-hexyl-3-methylimidazolium chloride, 1-butyl-4-methylpyridinium chloride and 1-ethyl-1-methylpyrrolidinium bromide were used. The ILs were built into helical state and confirmed by IR spectrometric techniques. Patterns of UV-Vis, photoluminescence, IR, and CD spectra indicated inclusion of small molecules into DNA structure. Molecular weight and radii of gyration values of ILs-DNA complexes chains were established by HPSEC-MALLS-RI method. Modification DNA with 1-ethyl-1-methylpyrrolidinium bromide gives more uniform material and leads to elimination of high molecular weight chains. Thus, the incorporation DNA double helical structure with both 1-hexyl-3-methylimidazolium chloride and 1-butyl-4-methylpyridinium chloride exhibited higher molecular weight values. Scanning electron microscopy images indicate formation of nanofibre structures in all DNA complexes. Fluorescence depends strongly on the environment in which the chromophores are inserted and simultaneously on the molecular interactions with the biopolymer matrix. The most intensive emission was observed for DNA-imidazole ring complex. Decrease in intensity UV-Vis peak absorption is a consequence of a reduction in the spatial order of polynucleotide strands and provides different π - π stacking structure. Changes in optical properties confirmed by spectroscopy methods make DNA-ILs complexes potential biosensor applications.

Keywords : biopolymers, biosensors, cationic surfactant, DNA, DNA-gels

Conference Title : ICBC 2018 : International Conference on Biomaterials and Chemistry

Conference Location : London, United Kingdom

Conference Dates : January 18-19, 2018