

STUDY OF CARBONACEOUS MATERIALS AND THEIR INTERACTION WITH BIOLOGICAL MOLECULES

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Molecular structure of carbon-based materials as graphite, fullerene C_{60} , carbon nanotubes (CNT) and their interaction with nucleic acids were studied with FTIR and SEIRA (Surface enhanced infrared absorption) spectroscopy. The interaction of DNA with carbon-based materials is of great scientific and applied interest, however- until now it is not clear. We studied the interaction between DNA and CNT (or other carbon-based materials) by SEIRA spectroscopy. Due to using of gold substrate we observed the effect of SEIRA (Surface Enhanced Infra-Red Absorption) for nucleic acids [1] and C_{60} [2].

We studied the peculiarities of vibration states of different modifications of carbon materials and concluded that halfwidth of fundamental tones of C_{60} and CNT are essentially less than those for graphite. So, the interaction between molecules in these new forms of carbon is less and they show molecular properties even in crystalline phase.

We obtained changes in vibration modes of the marker bands of DNA that can be an evidence of the DNA interaction with carbon-based materials. Some transformation of H-bonds in the region of OH-, NH- and CH-vibrations was observed in all cases. For DNA+CNT the relative intensity of base vibrations is increased twice in a spectrum of DNA/CNT in comparison with reference DNA. The stretching asymmetrical phosphate band shift from 1235 (A-form) to 1225 cm^{-1} (B-form), its intensity was increased by 20 %

and the halfwidth increased about 5 cm^{-1} . The changes in sugar conformation indicate to A-B transition in DNA. So, we could suppose that CNT causes A-B transition in some fragments of DNA sugar-phosphate backbone that can be in agreement with model of DNA wrapped around CNT [2], [3].

The interaction of other form of carbon with DNA is discussed also.

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