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DNA as a catalyst in photoinduced processes and nanoscale resonance nonradiative electron excitation energy transfer

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The aim of the present work is spectroscopic study of DNA catalytic properties in the following processes: restore; formation of inter-strand cross-links; performing of photodynamic effects and nanoscale fluorescence resonance energy transfer (FRET). The most attention is paid to the latter, as truly nanoscale method in its origin. The method of laser induced FRET to donor-acceptor intercalator pair for quantitative and qualitative study of stability quality DNA double helix in solution in real time is offered. FRET method allows us to estimate the concentration of double helix areas with high quality stability applicable for intercalation in DNA after it was subjected to stress effect. It gives the opportunity to compare various types of DNAs with: different origin; various damage degrees; being in various functional states. Also the goal of present research is the absorption spectroscopic studies of resonance interaction of silver atoms in different conditions: in silver nanoparticles; bound to double helix of DNA; in complex with oligodeoxynucleotides (d(CGCGAATTCGCG)); encapsulated in polyamidoamine (PAMAM) of fourth generation G4 (~4 nm). It is shown that AgNPs (1-2 nm size) represent liquid drops which moisture the DNA surface at interaction. At photo-irradiation of AgNPs-DNA complex DNA dependant conformational transition takes place due to fast and intensive heating. Also it is shown that in the interaction of atoms of silver reduced by ascorbic acid and in photo-desorption of AgNPs DNA double helix serves as a matrix, namely together with the silver atoms forms the rigid one-dimensional periodic structure.

Biography

Tamar G Giorgadze has completed her PhD in the year 2015 from St. Andrew, The First-Called Georgian University. She is a Research Scientist at the Department of Biological Systems of Physics, Andronikashvili Institute of Physics. She has published more than 5 papers in reputed journals.

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