



Olga A. Ryazanova, Ph.D.

(born September 26, 1967)

Research fellow

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Education:

M.Sci – 1989 (physical optics and spectroscopy) , Dept. of physics , Kharkov State University, Kharkov , Ukraine

Ph.D – 2008 (thermal physics and molecular physics), B. Verkin Institute for Low Temperature Physics and Engineering NAS of Ukraine, Kharkov , Ukraine

Degree

1989 - M.Sci., Honour Diploma of Physics. **Master's thesis:** «Sensibility of the cathodoluminescence spectra of $YBa_2Cu_3O_{7-8}$ to the superconductivity transition» supervised by Dr. V.N. Samovarov, Institute for Low Temperature Physics and Engineering NAS of Ukraine.

2008 - Ph.D. (thermal physics and molecular physics). **Ph.D. thesis:** “Effect of biologically active ligands on the stability of intermolecular homopolynucleotide complexes” supervised by Prof. Dr. V.N. Zozulya, Institute for Low Temperature Physics and Engineering NAS of Ukraine.

Research areas: molecular spectroscopy, molecular biophysics, physical chemistry

Research Interests :

- Effect of divalent metal ions on the conformational transitions in polynucleotide systems
- Photophysical properties of intercalative dyes
- Interaction of intercalative dyes with synthetic polynucleotides of various base compositions and secondary structures
- Thermodynamics of the hybridization of antisense oligonucleotides and triplex forming agents modified by intercalating dyes
- Self-assembly of porphyrin derivatives on polyionic biopolymer templates
- Fluorescent probes for the recognition of self-assembled guanosine structures
- Interaction of porphyrin derivatives with poly(G) and G-rich oligonucleotides forming G-quadruplexes
- Targeting of G-quadruplex forming systems by small molecules to enhance their thermostability

Area of expertise: Study of spectroscopic properties of anticancer drugs alone and their binding to nucleic acids and another biopolymers, conformation transition in multi-stranded oligo- and polynucleotide systems, including G-quadruplex one, using UV-VIS absorption, fluorescence and static light scattering as well as melting technique with registration of absorption and fluorescence changes.

Technical skills:

- UV-visible absorption spectroscopy
- polarized fluorescent spectroscopy
- static light scattering
- melting technique with absorption and fluorescent registration of melting curves

Honours and Awards

1989 – Magister's diploma with first-class honour degree.

2004 – Winner (with co-authors) of Annual Prize of B.Verkin Institute for Low Temperature Physics & Engineering of NASU for best article in area of biophysics

2008 – Winner (with co-authors) of Annual Prize of B.Verkin Institute for Low Temperature Physics & Engineering of NASU for best article in area of biophysics

2010 – Winner (with co-authors) of Annual Prize of B.Verkin Institute for Low Temperature Physics & Engineering of NASU for best article in area of biophysics

Participation in the International Joint Scientific Projects:

1999-2001– grant No. 97-31158 of INTAS Program.

2002-2004 – grant UB2-2442-KH-02 of Civilian and Research Development Foundation (CRDF) Program.

2005-2006 – UNESCO/ IBSP Project 2-UA-03 (Contract No: 4500027456).

2005-2007 – grant No. 3172 of Science and Technology Center in Ukraine .

2009-2012 – participation in COST MP0802 Action "Self-assembled guanosine structures for molecular electronic devices"

Languages: Russian and Ukrainian – native languages, fluent in English, understand Polish.

Organizational:

1. Scientific Secretary of Local Organizing Committee of International Conference "NANOBIOPHYSICS: Fundamental and Applied Aspects" which was held at B.Verkin Institute for Low Temperature Physics and Engineering of the NAS of Ukraine (October 5-8, 2009), Kharkov, Ukraine <http://www.ilt.kharkov.ua/nbp2009/eng/committee.html>
2. Scientific Secretary of Local Organizing Committee of 3rd International Conference "NANOBIOPHYSICS: Fundamental and Applied Aspects" which was held at B.Verkin Institute for Low Temperature Physics and Engineering of the NAS of Ukraine (October 7-10, 2013), Kharkov, Ukraine <http://www.ilt.kharkov.ua/nbp2013/committee.html>
3. Scientific Secretary of Local Organizing Committee of 5th International Conference "NANOBIOPHYSICS: Fundamental and Applied Aspects" which was held at B.Verkin Institute for Low Temperature Physics and Engineering of the NAS of Ukraine (October 2-5, 2017), Kharkov, Ukraine <http://www.ilt.kharkov.ua/nbp2017/>

Publications:

1. Yu.V. Didan, M.M. Ilchenko, V.V. Negrutka, L.V. Dubey, O.A. Ryazanova, I.Ya. Dubey "Interaction of cationic porphyrin-imidazophenazine conjugates with DNA quadruplex: FID assay and quantum-chemical modelling Biopolym. Cell. 2018; 34(5):389-401. <http://dx.doi.org/10.7124/bc.00098B>

2. O. Ryazanova, V. Zozulya, I. Voloshin, A. Glamazda, I. Dubey, L. Dubey, V. Karachevtsev "Spectroscopic study on binding of cationic Pheophorbide-a to antiparallel quadruplex Tel22" – MS ID#: BIORXIV/2018/462291 doi: <https://doi.org/10.1101/462291>
3. O.A. Ryazanova, V.N. Zozulya, I.M. Voloshin, L.V. Dubey, I.Ya. Dubey "Binding of pheophorbide-a methyl ester to nucleic acids of different secondary structures: a spectroscopic study" arXiv.org > [physics](https://arxiv.org/abs/1811.01618) > arXiv:1811.01618 <http://arxiv.org/abs/1811.01618>
4. Ryazanova O., Zozulya V., Voloshin I., Glamazda A., Dubey I., Dubey L., Karachevtsev V. "Interaction of a tricationic meso-substituted porphyrin with guanine-containing polyribonucleotides of various structures", Methods Appl. Fluoresc. (2016) V. 4, Issue 3, 034005. DOI:10.1088/2050-6120/4/3/034005
5. Ryazanova O.A., Zozulya V.N., Voloshin I.M., Dubey L.V., Dubey I.Ya., Karachevtsev V.A. "Binding of Metallated Porphyrin-Imidazophenazine Conjugate to Tetramolecular Quadruplex Formed by Poly(G): a Spectroscopic Investigation", J. Fluoresc. (2015) V. 25, Issue 6, p. 1897-1904. DOI 10.1007/s10895-015-1682-2
6. Ryazanova O.A., Zozulya V.N., Voloshin I.M., Dubey L.V., Dubey I.Ya., Karachevtsev V.A. "Spectroscopic Studies on Binding of Porphyrin-Phenazine Conjugate to Four-Stranded Poly(G)", J. Fluoresc. (2015) V. 25, Issue 4, p. 1013-1021. DOI 10.1007/s10895-015-1585-2
7. Zozulya V.N., Ryazanova O.A., Voloshin I.M., Ilchenko M.M., Dubey I.Ya., Glamazda A.Yu., Karachevtsev V.A. "Self-assemblies of tricationic porphyrin on inorganic polyphosphate" Biophysical Chemistry (2014), v. 185(1), p. 39-46. <http://dx.doi.org/10.1016/j.bpc.2013.11.006>
8. Voloshin I.M., Ryazanova O.A., Karachevtsev V.A., Zozulya V.N. "Calculating the contribution of different binding modes to Quinacrine -DNA complex formation from polarized fluorescence data", ArXiv (2013) No. 1311.6362. <http://arxiv.org/abs/1311.6362>
9. Ryazanova O.A., Dubey L.V., Dubey I.Ya., Zozulya V.N., "Spectroscopic study on the effect of imidazophenazine tethered to 5'-end of pentadecathymidilate on stability of poly(dA)•(dT)15 Duplex" Journal of Fluorescence" (2012), vol 22(6), p. 1431-1439 DOI: 1007/s10895-012-1080-y
10. I.M. Voloshin, O.A. Ryazanova , V.N. Zozulya "Competition between two quinacrine–DNA binding modes from polarized fluorescence data" Biophysical Bulletin (2012) v.27 (2), p. 31-39. (in Russian) <http://periodicals.karazin.ua/biophysvisnyk/article/view/2527/2270>
11. Zozulya V.N., Ryazanova O.A., Voloshin I.M., Dubey L.V., Dubey I.Ya. "Spectroscopic Studies on Binding of Porphyrin-Phenazine Conjugate to Intramolecular G-Quadruplex Formed by 22-mer Oligonucleotide" International Review of Biophysical Chemistry (2011) vol. 2(4), p. 112-119. http://www.praiseworthyprize.com/IREBIC-latest/IREBIC_vol_2_n_4.html#Spectroscopic_Studies_on_Binding_of_Porphyrin-Phenazine_Conjugate_to_Intramolecular_G-Quadruplex_Formed_by_22-mer_Oligonucleotide
12. Dubey L.V., Ilchenko M.M., Zozulya V.N., Ryazanova O.A., Pogrebnoy P.V., Dubey I.Ya "Synthesis, Structure and Antiproliferative Activity of Cationic Porphyrin - Imidazophenazine Conjugate" International Review of Biophysical Chemistry (2011) vol. 2(4), p. 147-152. http://www.praiseworthyprize.com/IREBIC-latest/IREBIC_vol_2_n_4.html#Synthesis_Structure_and_Antiproliferative_Activity_of_Cationic_Porphyrin_-_Imidazophenazine_Conjugate
13. Dubey L., Ryazanova O., Zozulya V., Fedoryak D., Dybey I. "Postsynthetic Modification of Oligonucleotides with Imidazophenazine Dye and its Effect on Duplex Stability" Nucleosides, Nucleotides and Nucleic Acids (2011) vol. 30(7-8), p. 585-596.

14. Victor Zozulya, Olga Ryazanova, Nataliya Zhigalova, Yurii Blagoi "Effect of Ni²⁺ and Cd²⁺ ions on thermally induced conformational transitions in poly(dA)-poly(dT) system" *BioMetals* (2010) vol. 23(6), p.1191-1201 DOI: 10.1007/s10534-010-9369-2 <http://www.springerlink.com/index/HW4LL342811J7241.pdf>
15. V.N. Zozulya, O.A. Ryazanova, I.M. Voloshin, A.Yu. Glamazda, V.A. Karachevtsev Spectroscopic Detection of Tetracationic Porphyrin H-Aggregation on Polyanionic Matrix of Inorganic Polyphosphate. *Journal of Fluorescence* (2010), vol. 20(3), p. 695-702. DOI:10.1007/s10895-010-0609-1 <http://www.springerlink.com/index/20586352303h2333.pdf>
16. O.A. Ryazanova, I. M . Voloshin, L.V. Dubey, V.N. Zozulya "Spectroscopic study of pheophorbide-a methyl ether binding to synthetic polynucleotides and DNA" *Biophysical Bulletin* (2009) v. 23 (2), p. 20-29 (in Russian). http://www-biomedphys.univer.kharkov.ua/JOURNAL/pdf/23_2.pdf
17. O.A. Ryazanova, I.M. Voloshin, I.Ya. Dubey, L.V. Dubey , V.N. Zozulya " Fluorescent studies on cooperative binding of cationic Pheophorbide-a derivative to polyphosphate ", *Annals of the New York Academy of Sciences* (2008) v. 1130, p. 293-299. DOI: 10.1196/annals.1430.033
18. O.A. Ryazanova, I.M. Voloshin, I.Ya. Dubey, L.V. Dubey and V.N. Zozuly a "Spectroscopic studies on binding of cationic Pheophorbide-a derivative to model polynucleotides" , *IFMBE Proceedings* (2008) v.20, p. 397-400. DOI: 10.1007/978-3-540-69367-3_107
19. O.A. Ryazanova, I.Ya. Dubey, V.N. Zozulya "Investigation of the effect of covalently attached phenazine dye on helix-to-coil transition in mixed poly(rA)-(dT) 14 system", *Biophysical Bulletin* (2008) v.20 (1), p. 17-23. (in Russian) http://www-biomedphys.univer.kharkov.ua/JOURNAL/pdf/20_2.pdf
20. O.A. Ryazanova , I . M . Voloshin , V . L . Makitruk , V . N . Zozulya , V . A . Karachevtsev " pH – Induced changes in electronic absorption and fluorescence spectra of phenazine derivatives", *Spectrochimica Acta Part A : Molecular and Biomolecular Spectroscopy* (2007) v . 66 (4-5), p . 849-859. [doi :10.1016/j.saa.2006.04.027](https://doi.org/10.1016/j.saa.2006.04.027)
21. Olga Ryazanova, Victor Karachevtsev, Igor Voloshin and Victor Zozulya. "Investigation of self-assembly of pheophorbide-a on poly-L-Lysine matrix", *Journal of Porphyrins and Phthalocyanines* (2006), v. 10 (4-6), p. 846.
22. O.A. Ryazanova, V.N. Zozulya, I.M. Voloshin, V.A. Karachevtsev, V.L. Makitruk, S.G. Stepanian. " Absorption and fluorescence spectral studies of imidazophenazine derivatives". *Spectrochimica Acta Part A* (2004), v.60 (8-9), p. 2005-2011. [doi:10.1016/j.saa.2003.10.020](https://doi.org/10.1016/j.saa.2003.10.020)
23. Zozulya V.N., Nesterov A.B., Ryazanova O.A., Blagoi Yu.P. "Conformational transitions and aggregation in poly(dA)-poly(dT) system induced by Na⁺ and Mg²⁺ ions". *The International Journal of Biological Macromolecules (UK)* (2003) v. 33 (4-5), p. 183-191 . [doi:10.1016/j.ijbiomac.2003.08.003](https://doi.org/10.1016/j.ijbiomac.2003.08.003)
24. V. Zozulya, Yu. Blagoi, I. Dubey, D. Fedoryak, V. Makitruk, O. Ryazanova, A. Shcherbakova " Anchorage of an Oligonucleotide Hybridization by a Tethered Phenazine Nucleoside Analogue." *Biopolymers (Biospectroscopy)* (2003) 72 (4), p. 264-273. [Doi:10.1002/bip.10403](https://doi.org/10.1002/bip.10403)