# PhD. Irine Khutsishvili

Senior Research Scientist
Department of Physics of Biological Systems
Ivane Javakhishvili Tbilisi State University Andronikashvili Institute of Physics

Bionanophysical direction

6 Tamarashvili str,
0177 Tbilisi, Georgia
Tel: +(995 32) 2 398 783
Fax: +(995 32) 2 391 494
Web: www.aiphysics.ge
E-mail: ikhutsihvili@yahoo.com

## Education:

1997 Ph.D, Andronikashvili Institute of Physics, Tbilisi Georgia.
Specialization - Biophysics

1980- 1985 Master, Ivane Javakhishvili Tbilisi State University,
Specialization - Biophysics

## Work Experience:

**2020 –** present -Research Scientist, Department of Pharmaceutical Sciences
University of Nebraska Medical Center (Nebraska, USA)

**2014-2020 -** Senior Research Scientist, Department of Physics of Biological Systems
Ivane Javakhishvili Tbilisi State University Andronikashvili Institute of Physics,
Tbilisi, Georgia.

**2011-2014 -** Research Scientist, Department of Pharmaceutical Sciences
University of Nebraska Medical Center (Nebraska, USA)

**2005- 2010 -** Research Associate, Department of Pharmaceutical Sciences University of Nebraska Medical Center (Nebraska, USA)

**1997–2005** - Senior Research Scientist, Department of Nuclear Physical and Optical Methods of Analysis Institute of Physics of Georgian Academy of Sc. Tbilisi, Georgia.

**1990-1997** - Research Scientist, Department of Nuclear Physical and Optical Methods of Analysis Institute of Physics of Georgian Academy of Sc. Tbilisi, Georgia.

**1987 – 1990** - Graduate Student, Department of Spectral Research of Biopolimers Institute of Physics of Georgian Academy of Sc.

**1985 – 1987** - Laboratory Assistant, Department of Spectral research of Biopolimers, Institute of Physics of Georgian Academy of Sc.

**Scientific Interests:**

Bionanophysics;
Molecular Biophysics;
Nanotechnologies;
Photo induced Processes.

**List of Patents:**

**2006 -** Method of growing leguminous cultures
GE Tbilisi (Author Certificate GE AU 2006 1290 Y)

**2006 -** Organomineral bacterial fertilizer for processing seeds of leguminous cultures
GE Tbilisi (Author Certificate GE AU 2006 1289 Y)

**Participation in International Forums/Conferences:**

1. International conference and Expo on *Nanotechnology & Nanomaterial's*, 14-15 November 2019, Osaka, Japan.
2. 4th International Conference of *European Academy of Science* January 20-30, 2019, Bonn, Germany.
3. 5th International Conference "Nanotechnologies" Nano-2018, November 19-22, Tbilisi, Georgia.

4. 8th International Conference and Exhibition on Lasers, Optics & Photonics, November 15 -17, 2017 Las Vegas, Nevada, USA.
5. 15th World Congress on CANCER THERAPY, BIOMARKERS & CLINICAL RESEARCH, December 05-07. 2016, Philadelphia, USA.
6. 3rd International Conference on Medical Physics and Biomedical Engineering, November 07-08, 2016, Barcelona, Spain.
7. 2016 XXI International Seminar/Workshop on Direct and Inverse Problems of Electromagnetic and Acoustic Wave Theory (DIPED), September 27-29, 2016, Tbilisi, Georgia.
8. Modern Research and Prospects of Their Use in Chemistry, Chemical Engineering and Related Fields, September 21-23, 2016, Ureki, Georgia.
9. Science and Innovation Festival, September 16-25, 2016, Tbilisi, Georgia.
10. 4th International Conference "Nanotechnologies" Nano-2016, October 24-27, 2016 Tbilisi, Georgia.

**PhD. Irine Khutsishvili is the author of more than 40 scientific publications. Citation index 250, h-index 10.**

**Selected Publications:**

1. Tamar G. Giorgadze, Irine G. Khutsishvili, Zaza G. Melikishvili and Vasil G. Bregadze, Silver atoms encapsulated in G4 pamam (polyamidoamine) dendrimers as a model for their use in nanomedicine for phototherapy, *Eur. Chem. Bull.,* 9(1), 22-27. (2020)
2. Vasil G. Bregadze, **Irine G. Khutsishvili**, Tamar G. Giorgadze, Mikhail G. Gadabadze Teimuraz B. Khuskivadze., DNA Photonics: Spectroscopic and Thermodynamic Methods for Studying Nanotechnological Abilities of DNA in Biomedical Research, *Fourth International Conference of European Academy of Science,* 102-103, (2019)
3. Giorgadze TG, **Khutsishvili IG**, Khuskivadze TB , Melikishvili ZG and Bregadze VG., The Phenomena of Light Re-radiation and Electron Excitation Energy Transfer in Hydrolysis Reactions and for Analysis of the Quality of DNA Double Helix, *Advanced Techniques in Biology & Medicine*, Volume 5, Issue 2, 1-7, (2017).
4. Lee HT, Carr CE, **Khutsishvili I**, Marky LA. Effect of Loop Length and Sequence on the Stability of DNA Pyrimidine Triplexes with TAT Base Triplets. *J Phys Chem B. J. Phys. Chem. B*, , *121* (39), 9175–9184, (2017).

5. V. G. Bregadze, Z. G. Melikishvili, T. G. Giorgadze, **I. G. Khutsishvili**, T. B. Khuskivadze, Z. V. Jaliashvili and K. I. Sigua., Laser - Induced Fluorescence Resonance Energy Transfer for Analysis of Quality of DNA Double Helix, *Laser Phys. Lett.* 13 115601, p.1-7, (2016).
6. Vasil G. Bregadze, Zaza G. Melikishvili, Tamar G. Giorgadze, **Irine G. Khutsishvili**, Temur B. Khuskivadze, Zaza V. Jaliashvili, Absorption Spectroscopy of Silver Atoms and Nanomolecular Studies of DNA and Some Organic Structures, *2016 XXI International Seminar/Workshop on Direct and Inverse Problems of Electromagnetic and Acoustic Wave Theory (DIPED)* pp.145-149, (2016).
7. Chris M. Olsen, Ronald Shikiya, Rajkumar Ganugula, CallisteReiling-Steffensmeier, **Irine Khutsishvili**, Sarah E. Johnson, Luis A. Marky, Application of differential scanning calorimetry to measure the differential binding of ions, water and protons in the unfolding of DNA molecules *Biochimica et BiophysicaActa (BBA)* - General Subjects Volume 1860, Issue 5, Pages 990–998, (2016).
8. Calliste Reiling, **Irine Khutsishvili** and Luis A. Marky "DNA Pseudoknots with Appropriate Loop Lengths and Sequence Complementary to the Stem form Stabilizing Base-Triplet Stacks" *Biophysical Journal* 108(2), 392a. (2015)
9. Hui-Ting Lee, Alexander J. Lushnikov, **Irine Khustsishvili** and Luis A. Marky "Thermodynamics for the Interaction of PEG-PLL Copolymers with DNA" *Biophysical Journal*; 108(2),:352a-353a. (2015)
10. Calliste Reiling, **Irine Khutsishvili**, Kai Huang and Luis A. Marky; "Loop Contributions to the Folding Thermodynamics of DNA Straight Hairpin Loops and Pseudoknots" *The Journal of Physical Chemistry B* 119(5), 1939–1946 (2015)
11. **Irine Khutsishvili**, Sarah E. Johnson, Calliste Reiling, Iztok Prislan, Hui-Ting Lee, and Luis A. Marky; "Interaction of DNA Intramolecular Structures with Their Complementary Strands: A Thermodynamic Approach for the Control of Gene Expression" Chemical Biology of Nucleic Acids, RNA Technologies, V.A. Erdmann et al. (eds.), Springer-Verlag Berlin Heidelberg 367-383. (2014)
12. Simone, Peter D.; Struble, Lucas R.; Kellezi, Admir; Brown, Carrie A.; Grabow, Corinn E.; **Khutsishvili, Irine**; Marky, Luis A.; Pavlov, Youri I.; Borgstahl, Gloria E. O. "The human ITPA polymorphic variant P32T is destabilized by the unpacking of the hydrophobic core." *Journal of Structural Biology* 182, 197-208. (2013)
13. **Khutsishvili, Irine**; Zhang, Na; Marky, Luis A.; Crean, Conor; Patel, Dinshaw J.; Geacintov, Nicholas E.; Shafirovich, Vladimir "Thermodynamic Profiles and Nuclear Magnetic Resonance Studies of Oligonucleotide Duplexes

Containing Single Diastereomeric Spiroiminodihydantoin Lesions." *Biochemistry* 52, 1354-1363. (2013)

14. Lee, Hui-Ting; Waters, Lela; Olsen, Chris M.; **Khutsishvili, Irine**; Marky, Luis A. "Probing the temperature unfolding of a variety of DNA secondary structures using the fluorescence properties of 2-aminopurine." *Acta Chimica Slovenica* 59, 443-453. (2012)
15. Liu, Xin-Ming; Zhang, Yijia; Chen, Fu; **Khutsishvili, Irine**; Fehringer, Edward V.; Marky, Luis A.; Bayles, Kenneth W.; Wang, Dong "Prevention of Orthopedic Device-Associated Osteomyelitis Using Oxacillin-Containing Biomineral-Binding Liposomes" *Pharmaceutical Research* 29, 3169-3179. (2012)
16. Prislan, Iztok; **Khutsishvili, Irine**; Marky, Luis A. "Interaction of minor groove ligands with G-quadruplexes: Thermodynamic contributions of the number of quartets, T-U substitutions, and conformation." *Biochimie* 93, 1341-1350. (2011)
17. Singh, Sreelekha K.; Szulik, Marta W.; Ganguly, Manjori; **Khutsishvili, Irine**; Stone, Michael P.; Marky, Luis; Gold, Barry "Characterization of DNA with an 8-oxoguanine modification» *Nucleic Acids Research 39*, 6789-6801. (2011)
18. Maiti, Souvik; Kankia, Besik; **Khutsishvili, Irine**; Marky, Luis "Melting behavior and ligand binding of DNA intramolecular secondary structures." *Biophysical Chemistry 159*, 162-171. (2011)
19. Hui-Ting Lee, Caroline Carr, Hollie Siebler, Lela Waters, **Irine Khutsishvili**, Fany Iseka, Brian Domack, Chris M. Olsen, and Luis A. Marky "A Thermodynamic approach for the Targeting of Nucleic Acid Structures Using Their Complementary Single Strands." *Methods in Enzymology*, ed. M.L. Jonson, J.M. Holt, G.K.Ackers. vol. 492, chap.1, 1-26. (2011)
20. Hui-Ting Lee, **Irine Khutsishvili,** and Luis A. Marky "DNA Complexes Containing Joined Triplex and Duplex Motifs: Melting Behavior of Intramolecular and Bimolecular Complexes with Similar Sequences" *J. Phys. Chem. B*, *114,* 541–548. (2010)
21. **Irine Khutsishvili**, Sarah Johnson, Hui-Ting Lee, and Luis A. Marky "Unfolding Thermodynamics of DNA Intramolecular Complexes Involving Joined Triple- and Double-Helical Motifs." *Methods in Enzymology*, ed. M.L. Jonson, J.M. Holt, G.K.Ackers. vol. 466, chap.20, 477-502. (2009)
22. V. Bregadze, E. Gelagutashvili, K. Tsakadze. "Thermodynamic Models of Metal Ion - DNA Interactions. In: *Metal Complex-DNA Interactions*" (Eds. N. Hadjiliadis and E. Sletten, Blackwell Publishing Ltd, UK), Chap. 2, 31-53, (2009)

23. V. Bregadze, I. Khutsishvili, J. Chkhaberidze, K. Sologashvili. "DNA as a mediator for proton, electron and energy transfer induced by metal ions". *Inorganic Chemical Acta,* 339, 145-159, (2002)
24. V.G. Bregadze, J.G. Chkhaberidze, I.G. Khutsishvili "Effects of Metal Ions on the Fluorescence of Dyes bound to DNA" In: "*Metal Ions in Biological Systems*", (H. Sigel, eds.), Marrcel Dekker Inc., New York, Basel, 33, Chap.8, 253-267, (1996)