

BIOGRAPHICAL SKETCH

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<p>NAME Asanov, Alexander N.</p> <p>eRA COMMONS USER NAME (credential, e.g., agency login) BioElectroSpec</p>	<p>POSITION TITLE Chief Executive Officer and Scientific Director TIRF Labs, Inc., Wendell, North Carolina</p>		
<p>EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i></p>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	MM/YY	FIELD OF STUDY
Moscow Institute for Physics and Technology, Moscow	M.S.	07/1972	Biophysics
Institute of Chemical Physics, Russian Academy of Sciences, Moscow	Ph.D.	05/1977	Chemical Physics

A. Personal Statement: My research interests focus on CBRNE security, molecular diagnostics, single molecule biology, biomolecular interactions, ion channel studies, applications of fluorescence spectroscopy and electrochemistry for biomolecular engineering and understanding structure-function relationships, with emphasis on application of Total Internal Reflection Fluorescence (TIRF) and TIRF combined with electrochemistry for super resolution microscopy, single molecule biology, and molecular diagnostics studies. In the former USSR four Nobel Prize winners: N. N. Semenov, P. L. Kapitza, A. D. Sakharov, V. L. Ginzburg, academicians K. I. Zamaraev, A. E. Shilov, Dr. I. Y. Sarkisov, Dr. E. M. Trukhan, in USA Dr. W.W.Wilson, Dr.P.B.Oldham, Dr.L.DeLucas, Dr. L.A.Vaca, Dr. Z. Gryczynski, and dozens of other brilliant scientists trained me in several fields, which placed me into uniquely advantageous position in the area of molecular diagnostics, and super-resolution bioimaging, enabled me with the exceptionally broad spectrum of skills and knowledge. I am not taking this great favor for granted. I return back to society. My gurus had similar feelings in their blood and granted to me their epigenetics together with their knowledge and skills. I feel responsibility for the results of my studies and am passionately fighting for the highest moral standards in all fields of sciences and technologies. All scientific discoveries are double edge swords; they can be used to benefit as well as to damage humanity. Each powerful discovery should be enabled with the highest moral values. I am applying this principle to all my scientific endeavors. In 1999-2014, I served as Principal Investigator on several BAA and SBIR grants, awarded by NIH and HSARPA of \$4.3 million. I assembled a team of scientists and engineers, who have developed 2 clusters of innovative TIRF instruments: TIRF Analytix for laboratory settings and i-Diagnostics for home-use and point-of-care settings. My colleagues and I have pioneered several groundbreaking discoveries and accumulated unique experience in using the TIRF technique and other analytical methods for life science applications. I have a uniquely broad background in spectroscopy, electrochemistry, surface chemistry, molecular biology, cell biology, nanoengineering, mechanical engineering, and optical engineering, which are key areas for the proposed project. Each of our prior projects resulted in the development of advanced TIRF devices and instruments, which exceeded expectations from typical research grants. Our customers from academic and pharmaceutical research groups have generated unique research data using our TIRF Analytix products, and have published articles in leading scientific journals. I have a record of successful R&D projects in the area of molecular diagnostics and believe that my prior experiences have prepared me well to lead the proposed project.

B. Positions and Honors. Positions and Employment

- 1987-1994 Senior Research Scientist, Institute of Chemical Physics of the Russian Academy of Sciences, Moscow, Russia.
- 1994-2001 Research Scientist / Instructor, Center for Macromolecular Crystallography, University of Alabama at Birmingham, and Department of Chemistry, Mississippi State University, MS.
- 2001 – 2011 President and Scientific Director, TIRF Technologies, Inc.
- 2012 –present CEO and Scientific Director, TIRF Labs, Inc.

Other Experience and Professional Memberships

- 2003-present - NIH Study Sections CBA10B, NCI MAT 309, member
- 2008-present – NSF Panel of Reviewers, member, and ad hoc reviewer

Professional Societies

- 1994 - present - American Chemical Society, member
- 1994 - present - Biophysical Society, member
- 1997- present - Society for Applied Spectroscopy, member
- 1997- present - American Association for Advancement of Sciences, member

Honors and Awards

- 1990 - N.N. Semenov's award
- 1991 - Russian Academy of Science Award for Best Interdisciplinary Research

Selected Invited Lectures

- 1998 Invited speaker at the FACSS'98 meeting, Austin, Texas.
- 2009 Invited speaker at the International Conference PepCon 2009, Seoul, South Korea.
- 2007, 2009, 2010, 2012, 2014, 2016, 2018 Invited speaker at the International Conferences Biodetection Technologies, USA.
- 2013 Invited speaker at the International Conference Evanescence 2013, Paris, France.
- 2011, 2015 Invited speaker at the Point of Care Diagnostics World Congress, San Diego, USA.
- 2016 – Invited speaker at the 4th Midwest Single Molecule Workshop, University of Iowa, Iowa City.
- 2016 - SelectBio Conferences\NGS, SCA, SMA, MS: Research to Diagnostics, San Diego, CA.
- 2017 – invited speaker at the National Laboratory of Biomacromolecules, Institute of Biophysics, Chinese Academy of Sciences, Beijing, China
- 2025 - invited speaker at the SelectBIO Microfluidics Webinar a Platform for the Commercialization of 3D-Printed Microfluidics

C. Selected Peer-Reviewed Publications

Asanov, A.N.; Larina, L.L. Electrochemical control of protein interactions with solid surfaces. Editor: Allen, Milton J. Charge and Field Effect in Biosystems-3, (1992), 13-27. Publisher: Birkhaeuser, Boston, MA.

Asanov, A.N.; De Lucas, L.J.; Oldham, P.B.; Wilson, W. W. Heteroenergetics of bovine serum albumin adsorption from good solvents related to crystallization conditions. *J. Colloid Interface Sci.* (1997), 191(1), 222-235.

Asanov, A.N.; De Lucas, L.J.; Oldham, P.B.; Wilson, W. W. Interfacial aggregation of bovine serum albumin related to crystallization conditions studied by total internal reflection fluorescence. *J. Colloid Interface Sci.* (1997), 196 (1), 62-73.

Asanov, A.N.; Wilson, W. W., Oldham, P.B. Regenerable Biosensor Platform: A Total Internal Reflection Fluorescence Flow Cell with Electrochemical Control. *Analytical Chemistry* (1998), 70 (6), 1156-1163.

Qian, F.; Asanov, A. N.; Oldham, P. B. A total internal reflection fluorescence biosensor for aluminum (III). *Microchem. J.* (2001), 70 (1), 63-68.

Sampieria A.; Zepeda, A; Asanov, A.; Vaca, L. Visualizing the store operated channel complex assembly in real time: Identification of SERCA2 as a new member. *Cell Calcium*, 45, (2009), 439-446.

Asanov, A.; Zepeda, A.; Vaca L. A novel form of Total Internal Reflection Fluorescence Microscopy (LG-TIRFM) reveals different and independent lipid raft domains in living cells. *Biochimica et Biophysica Acta*, 1801 (2010), 147-155.

Asanov A.; Zepeda A.; and Vaca L. A Platform for Combined DNA and Protein Microarrays Based on Total Internal Reflection Fluorescence. *Sensors*, 2012, 12, 1800.

Luz-Madrigal A.; Asanov A.; Camacho-Zarco A.R.; Sampieri A.; and Vaca L. A Cholesterol Recognition Amino Acid Consensus Domain in GP64 Fusion Protein Facilitates Anchoring of Baculovirus to Mammalian Cells. *Journal of Virology*, 87 (2013), 11894-11907.

Asanov A.; Sherry R.; Sampieri A.; and Vaca L. A relay mechanism between EB1 and APC facilitate STIM1 puncta assembly at endoplasmic reticulum–plasma membrane junctions. *Cell Calcium*, 54 (2013), 246–256.

Asanov A, Sampieri A, Moreno C, Pacheco J, Salgado A, Sherry R, Vaca L. Combined single channel and single molecule detection identifies subunit composition of STIM1-activated transient receptor potential canonical (TRPC) channels. *Cell Calcium*. 2015 Jan; 57(1):1-13.

Asanov A, Zepeda A, Vaca L. A novel form of Total Internal Reflection Fluorescence Microscopy (LG-TIRFM) reveals different and independent lipid raft domains in living cells. *Biochim Biophys Acta*. 2010 Feb;1801(2):147-55.

Asanov A, Sherry R, Sampieri A, Vaca L. A relay mechanism between EB1 and APC facilitate STIM1 puncta assembly at endoplasmic reticulum-plasma membrane junctions. *Cell Calcium*. 2013 Sep;54(3):246-56.

Luz-Madrigal A, Asanov A, Camacho-Zarco AR, Sampieri A, Vaca L. A cholesterol recognition amino acid consensus domain in GP64 fusion protein facilitates anchoring of baculovirus to mammalian cells. *J Virol*. 2013 Nov;87(21):11894-907.

Asanov A, Sampieri A, Moreno C, Pacheco J, Salgado A, Sherry R, Vaca L. Combined single channel and single molecule detection identifies subunit composition of STIM1-activated transient receptor potential canonical (TRPC) channels. *Cell Calcium*. 2015 Jan;57(1):1-13.

Paceco J, Dominguez L, Bohórquez-Hernández A, Asanov A, Vaca L. A cholesterol-binding domain in STIM1 modulates STIM1-Orai1 physical and functional interactions. *Scientific Reports*, 2016 Jul 27;6:29634

Méndez-Acevedo KM, Valdes VJ, Asanov A, Vaca L. A novel family of mammalian transmembrane proteins involved in cholesterol transport. *Scientific Reports*, 2017 Aug 7;7(1):7450.

Bohórquez-Hernández A, Gratton E, Pacheco J, Asanov A, Vaca L. Cholesterol modulates the cellular localization of Orai1 channels and its disposition among membrane domains. *Biochim Biophys Acta*. 2017 Dec;1862(12):1481-1490.

Sampieri A, Santoyo K, Asanov A, Vaca L. Association of the IP3R to STIM1 provides a reduced intraluminal calcium microenvironment, resulting in enhanced store-operated calcium entry. *Sci Rep*. 2018 Sep 5;8(1):13252.

Ceballos LG, Asanov A, Vaca L. Single-Channel Single-Molecule Detection (SC-SMD) System. *Methods Mol Biol*. 2018;1843:189-201.

Ceballos LG, Asanov A, Vaca L. Identifying TRP Channel Subunit Stoichiometry Using Combined Single Channel Single Molecule Determinations (SC-SMD). In: Kozak JA, Putney JW Jr., editors. *Calcium Entry Channels in Non-Excitable Cells*. Boca Raton (FL): CRC Press/Taylor & Francis; 2018. Chapter 15.

Bastián-Eugenio CE, Bohórquez-Hernández A, Pacheco J, Sampieri A, Asanov A, Ocelotl-Oviedo JP, Guerrero A, Darszon A, Vaca L. Heterologous calcium-dependent inactivation of Orai1 by neighboring TRPV1 channels modulates cell migration and wound healing. *Commun Biol*. 2019 Mar 4;2:88.

Asanov A, Sampieri A, Vaca L. Developing a Portable Device for the Identification of miRNAs in Fluids. *Methods Mol Biol*. 2021;2174:73-88. doi: 10.1007/978-1-0716-0759-6_6.

Sampieri A, Monroy-Contreras R, Asanov A, Vaca L. Design of Hydrogel Silk-Based Microarrays and Molecular Beacons for Reagentless Point-of-Care Diagnostics. *Front Bioeng Biotechnol*. 2022 Jul 22;10:881679. doi: 10.3389/fbioe.2022.881679.

Sampieri A, Asanov A, Méndez-Acevedo KM, Vaca L. SIDT2 Associates with Apolipoprotein A1 (ApoA1) and Facilitates ApoA1 Secretion in Hepatocytes. *Cells*. 2023 Sep 26;12(19):2353. doi: 10.3390/cells12192353

Sampieri A, Asanov A, Rodríguez-Hernández AP, Tobías-Juárez I, Martínez-Flores D, Vaca L. Chemical but not mechanical stimulation reduce TRPA1 channel lateral mobility. *Cell Calcium*. 2025 Nov;131:103059. doi: 10.1016/j.ceca.2025.103059. Epub 2025 Jul 31. PMID: 40763358

Sampieri A, Asanov A, Rodríguez-Hernández AP, Tobías-Juárez I, Vaca L. The handshake between the continuous remodeling of the endoplasmic reticulum and the store-operated calcium entry. *Cell Calcium*. 2026 Jan;133:103100. doi: 10.1016/j.ceca.2025.103100. Epub 2025 Nov 30. PMID: 41337943

D. Patents

Asanov, Alexander N.; Wilson, W. William; Oldham, Philip B. Regenerable biosensor using total internal reflection fluorescence with electrochemical control. U.S. Patent 6,511,854 (2003).

Asanov, Alexander N.; Real-time microarrays using total internal reflection fluorescence with electrochemical control for simultaneous detection of DNA, RNA, protein and metabolite bioanalytes. U.S. Patent pending (2025)

E. Research Support

Ongoing Research Support: N/A Completed

Research Support:

5 R 44 RR014385-02 Asanov (PI) 09/01/02 – 02/28/05 NIH/NCCR Phase II SBIR Role: PI

Fluorescence System for Sensing Biospecific Interactions Development of a turnkey analytical grade TIRF instrument.
Role: PI

1 R43 EB000644-01 Asanov (PI) 09/01/03-08/31/04 NIH/NIBIB Phase I SBIR Role: PI

Rapid Estimation of Gene Expression in Tissue Slices. Development of a method for rapid analysis of cancerous tissues.
Role: PI

1 R43 RR14385-01 Asanov (PI) 09/15/99 -03/14/00 NIH/NCCR Phase I SBIR

Fluorescence System for Sensing Biospecific Interactions Development of a total internal reflection fluorescence (TIRF) flow system for sensing biomolecular interactions. Role: PI

Phase II SBIR Contract No. NBCHC050060 Asanov (PI) 08/31/05-04/30/08

HSARPA of the Department of Homeland Security

Rapid Multianalyte Yoctomolar Biosensor Platform Development of a portable multianalyte biosensor for rapid analysis of bioterror agents. Role: PI

BAA BIAD2 Phase I Contract No NBCHC070128 Asanov (PI) 08/27/07-08/26/08

HSARPA of the Department of Homeland Security

Rapidly Responding Assays for Detection of Biothreats Development of assays for rapid detection of DNA/RNA and protein bioterror targets. Role: PI

Phase II SBIR Contract No NBCHC070099 Asanov (PI) 7/10/07-7/9/09

HSARPA of the Department of Homeland Security

Handheld Biosensor Platform Development of a handheld biosensor for rapid field analysis of bioterror agents. Role: PI