

## BIOGRAPHICAL SKETCH

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NAME <b>Asanov, Alexander N.</b>	POSITION TITLE <b>Chief Executive Officer and Scientific Director TIRF Labs, Inc., Cary, North Carolina</b>		
eRA COMMONS USER NAME (credential, e.g., agency login) <b>BioElectroSpec</b>			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
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 molecular diagnostics, biomolecular interactions, ion channel studies, applications of fluorescence spectroscopy and electrochemistry for biomolecular engineering and understand structure-function relationships, with emphasis on application of Total Internal Reflection Fluorescence (TIRF) and TIRF combined with electrochemistry for super resolution microscopy and molecular diagnostics studies. In 1999-2014, I served as Principal Investigator on several BAA and SBIR grants, awarded by NIH and HSARPA. I assembled and led a team of scientists and engineers, who have developed a family of innovative TIRF instruments for molecular diagnostics and analysis of biomolecular interactions. 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 broad background in spectroscopy, electrochemistry, surface chemistry, molecular biology, cell biology, nanoengineering, mechanical engineering, and optical engineering, which are key areas for this project. Each of our prior projects resulted in the development of advanced TIRF devices and instruments. Our customers from academic and pharmaceutical research groups have generated unique research data using our 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 Invited speaker at the International Conferences Biodetection Technologies, USA.
- 2013 Invited speaker at the International Conference Evanesence 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

### 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.

Pacheco J, Dominguez L, Bohórquez-Hernández A, Asanov A, Vaca L. A cholesterol-binding domain in STIM1 modulates STIM1-Orai1 physical and functional interactions. *Sci Rep*. 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. *Sci Rep*. 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.

### **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).

### **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

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

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