

# Sergey Vinogradov

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Expert in basic and applied R&D of photodetectors including Solid State Photomultipliers with strong management skills experienced in the development of novel devices is looking to do the best in design, R&D, and application of Solid State Photomultipliers with a professional team.

## AREAS OF EXPERTISE

- Physics and experimental research of solid state photodetectors including SSPM;
- Concepts and approaches to design, development and customization of SSPM;
- Device simulation techniques ranging from fingertip formulas to ISE TCAD 6.0;
- Methodology of measurements and characterization of SSPM,
- Application analysis, implementation and advanced technical support of VIP customers.

## PROFESSIONAL EXPERIENCE

**1982 – Present Senior Research Scientist at Lebedev Physical Institute of Russian Academy of Sciences, Moscow, Russia** [www.lebedev.ru/en/](http://www.lebedev.ru/en/)

Basic research of transient photoelectric processes in semiconductor heterostructures including Solid State Photomultipliers:

- Basic R&D of new avalanche photodetectors with negative feedback was conducted;
- Probabilistic metrology of low light level photon detectors like SSPM was developed;
- New type of photosensors with memory (PESM) was developed and patented;
- New method of deep level trapping site spectroscopy was developed and patented.

**2003 – 2010/09/30 Senior Staff Scientist, member of Technical Board at Amplification Technologies Inc., New York, USA** [www.ampti.net](http://www.ampti.net)

Research, development, measurement, simulation, and application of Discrete Amplification Photon Detectors (DAPD) – new generation of SSPM:

- Several designs of proprietary Discrete Amplification Photon Detector (DAPD) were developed and experimentally studied (head of experimental research group);
- Several designs of proprietary DAPD modules was developed to compete with Perkin Elmer Single Photon Counting Module (supervisor of module program);
- Reliability studies of DAPD was conducted and mass testing methods was implemented (principal investigator and supervisor of reliability program);
- Probabilistic metrology of DAPD was developed in Moscow lab and transferred to New York lab (principal investigator and supervisor of implementation program);
- Probabilistic-based approach to analysis of applicability and competitiveness of low light level photon detectors (DAPD, SSPM) was developed (principal investigator);
- Advanced application and customer technical support was established (head of application & support group);

**2004 – 2009 General Director at AMPTI LLC, Moscow, Russia**

Establishing and running Russian subsidiary of Amplification Technologies Inc. as a principal R&D lab of ATI (from 3 to 30 employees) [www.ampti.net](http://www.ampti.net)

**2001 – 2003 Head of Enterprise Asset Management System department at PLC Systems LLC, Moscow, Russia** [www.plcsystems.ru](http://www.plcsystems.ru)

Sales/Promotion/Distribution/Project management and implementation of large IT & Industrial Automation EAM projects in Russian oil, gas, power and mining industry [iom.invensys.com](http://iom.invensys.com)

**1995 – 2000 Head of Information Technology department at SEVCO Trading, Moscow, Russia** [www.sevco.ru/abouteng.asp](http://www.sevco.ru/abouteng.asp)

Development and running of IT infrastructure (150 PC) in very challenging Russian environment.

**1981 – 1982**                    **Engineer at Central Design Bureau, Krasnogorsk, Moscow reg. Russia**  
Simulation and evaluation of military FLIR focal plane array systems.

## PROFESSIONAL MEMBERSHIPS

**1994 – Present**                **member of SPIE** – International Society for Optical Engineering

**2009 – Present**                **member of IEEE** – Institute of Electrical and Electronics Engineers

## EDUCATION

**1987 – 1992**                    **Ph.D. in Solid State Physics**, Lebedev Physical Institute of Russian Academy of Sciences, Moscow, Russia

“Investigation of charge photoinjection, accumulation and relaxation processes in the heterostructures based on wide band gap semiconductors with deep level traps”, -182 p., 1992.

**1975 – 1981**                    **M.S. in Physics**, Lomonosov Moscow State University, Moscow, Russia

“Investigation of "zero-power" disclination defects in liquid crystals”, -45 p., 1980.

## PUBLICATIONS

1. S. Vinogradov et al., Characterization of single photon detection in solid state photomultipliers using multi-photon transit time histograms, *JINST*, submitted in Dec. 2010, in revision.
2. S. Vinogradov et al., Methodology of cross-talk measurements in solid state photomultipliers, *Bulletin of the Lebedev Physics Institute*, submitted in Dec. 2010, in print.
3. S. Vinogradov, T. Vinogradova, V. Shubin, D. Shushakov, and K. Sitarsky, Probabilistic Characterization of Solid State Photomultipliers Based on Transit Time Histograms, in *IEEE NSS/MIC 2010*, Conference Record N10-7, 2010.
4. S. L. Vinogradov, T. R. Vinogradova, V. E. Shubin, D. A. Shushakov, and K. Sitarsky, Probabilistic characterization of short light pulse and single photon detection processes, *Bulletin of the Lebedev Physics Institute*, submitted in May 2010, in print.
5. S. Vinogradov, T. Vinogradova, V. Shubin, D. Shushakov, and K. Sitarsky, “Efficiency of Solid State Photomultipliers in Photon Number Resolution”, *IEEE Trans. Nucl. Sci.*, to be in Feb. 2011.
6. S. Vinogradov, T. Vinogradova, V. Shubin, D. Shushakov, and K. Sitarsky, “Probability Distribution and Noise Factor of Solid State Photomultiplier Signals with Cross-Talk and Afterpulsing”, in *IEEE NSS/MIC 2009*, Conference Record N25-111, 2009.
7. S. L. Vinogradov, T. R. Vinogradova, V. E. Shubin, and D. A. Shushakov, Probabilistic Distribution and Noise Factor of Solid State Photomultiplier Signals, Taking Into Account Cross-Talk Processes, *Bulletin of the Lebedev Physics Institute*, 36, no 9, pp. 253–259, 2009.
8. V. Shubin, D. Shushakov, K. Sitarsky, E. Levin, E. Shelegeda, S. Vinogradov, L. Futlik, Innovation in solid state photomultipliers: Photodetectors based on the discrete amplification mechanism, in *IEEE NSS/MIC, 19 - 25 October 2008, Dresden, Germany*, 2008.
9. V. Shubin, D. Shushakov, K. Sitarsky, E. Levin, E. Shelegeda, S. Vinogradov, New approach to solid state photomultipliers, in *SORMA WEST 2008 - Symposium on Radiation Measurements and Applications, Berkeley, USA, June 2-5, 2008*.
10. E. Levin, E. Shelegeda, V.E. Shubin, D.A. Shushakov, C. Sitarsky, S. Vinogradov, Advances in the development of solid state photomultipliers for medical imaging, *Proc. SPIE* 6913, 69130J, 2008.
11. K. Linga, E. Godik, J. Krutov, V.B. Zaitsev, V.E. Shubin, D.A. Shushakov, S.L. Vinogradov, Novel sensor for ultrasensitive and single-molecule detection, *Proc. SPIE* 6092, 60920X, 2006.
12. K. Linga, E. Godik, E. V. Levin, J. Krutov, V.B. Zaitsev, V.E. Shubin, D.A. Shushakov, S.L. Vinogradov, Bio-sensing: the use of a novel sensitive optical detector, *Proc. SPIE* 6083, 60830F, 2006.
13. K. Linga, E. Godik, J. Krutov, D. Shushakov, V.E. Shubin, S.L. Vinogradov, E.V. Levin, Solid state photomultiplier: noise parameters of photodetectors with internal discrete amplification, *Proc. SPIE* 6119; 61190K, 2006.

14. S. L. Vinogradov and V. E. Shubin, Principles of Z-plane technology and on-sensor processing for photoelectric structures with memory, *Proc. SPIE* 2746, 216, 1996.
15. S. L. Vinogradov, V. E. Shubin, and I. D. Maglinov, Maneuvering target tracking by using image processing photosensor, *Proc. SPIE* 2561, 210, 1995.
16. V. E. Shubin, S. L. Vinogradov, and N. A. Dolgikh, Novel intelligent photosensor for airborne monitoring, *Proc. SPIE* 2555, 127, 1995.
17. S. L. Vinogradov, Charge spectroscopy of localized states in thin film heterostructures, *Proc. SPIE* 2554, 78, 1995.
18. S. L. Vinogradov and V. E. Shubin, Massively parallel image processing with a new integral multifunctional videosensor, *Proc. SPIE* 2488, 498, 1995.
19. V. E. Shubin and S. L. Vinogradov, Intelligent photosensor technology, *Proc. SPIE* 2344, 309, 1995.
20. S. L. Vinogradov and V. E. Shubin, Image processing photosensor for robots, *Proc. SPIE* 2349, 251, 1995.
21. S. L. Vinogradov and V. E. Shubin, Investigation of charge photoinjection and transport processes in photoelectric structures with memory, *Proc. SPIE* 2051, 927, 1994.
22. S. L. Vinogradov and V. E. Shubin, Optical image recording and processing by photoelectric structures with memory, *Proc. SPIE* 2051, 600, 1994.
23. J.A. Gorina, S.L. Vinogradov, A.L. Karuzsky and E.V. Kovalevsky, Manufacturing of photoelectric structures with memory by photo-stimulation technology, *Electronic Industry*, 1, 45, 1991.
24. S.L. Vinogradov, O.K. Malinovskaya and V.A. Tolokonnikov, Relaxation of trapping sites in the ZnSe films of Au-ZnSe-SiO<sub>2</sub>-Si structures, *Phys. Stat. Sol. (a)*, 111, 201, 1989.
25. S.L. Vinogradov, O.K. Malinovskaya and V.E. Shubin, Investigation of photoinjection and charge accumulation on trap centers in ZnSe films of Au-ZnSe-SiO<sub>2</sub>-Si structures, *Lebedev Physical Institute*, preprint 116, Moscow, -31 p., 1988.

## GRANTS AND CONTRACTS

1. V. Shubin, D. Shushakov, K. Sitarsky, and S. Vinogradov, R&D of avalanche photodetectors with negative feedback, contract «Photonics» N 81/00 between Lebedev Physical Institute and Amplification Technologies (2000 – 2010).
2. S.L. Vinogradov, Investigation of dynamic interaction of charge carrier delocalization and transport effects in thin film heterostructures and development of the charge relaxation spectroscopy of localized gap states, Russian Basic Research Foundation grant, Lebedev Physical Institute, Moscow (1994 -1995).
3. V.E. Shubin, S.L. Vinogradov, and I.D. Maglinov, Investigation of photoelectric structures with memory implementation for the development of the novel sensor-information space-based systems, contract on R&D, Lebedev Physical Institute, Moscow (1993-1995).
4. V.E. Shubin, S.L. Vinogradov and V.V. Vologin, Investigation of capabilities of electronic photography system based on photoelectric structures with memory, contract on R&D, Lebedev Physical Institute, Moscow (1991-1993).
5. V.E. Shubin, S.L. Vinogradov, V.V. Vologin, S.V. Bogdanov and D.A. Shushakov, Investigation of multilayered heterostructures (photoelectric structures with memory and avalanche structures with negative feedback) for development of the new generation of intelligent integrated multifunctional videosensors, Russian Basic Research Foundation grant, Lebedev Physical Institute, Moscow (1990-1993).

## PATENTS

1. S.L. Vinogradov, Method of energy level spectroscopy of trapping site in semiconductor materials, Russian patent 4906242, 1991.
2. S.L. Vinogradov, A.F. Plotnikov, and V.E. Shubin, Method and device for recording and processing of optical information, Russian patent 1213916, 1984.

**Recommendations may be available on request.**