# CURRICULUM VITAE INFORMATION FORM

Maarif.Jafarov

Professor department Semiconductor physics
Chief research scientist, Institute for Physical Problems,

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## PERSONAL DATA

**04 avgoust 1960,**

## EDUCATION AND ACADEMIC DEGREES OBTAINED

From 1977 to 1982: student, Faculty of Physics, Baku State University
1982: M.Sc. (with highest honors), Faculty of Physics, Baku State University
From 1982 to 1986: postgraduate student, Institute of Photoelectronics, Azerbaijan National Academy of Sciences
1989: Ph.D., "Semiconductor physics", Institute of Photoelectronics, Azerbaijan National Academy of Sciences, Baku
*2007D Electronic processes in single crystals of any $A^2$ $B^6$ type compounds and in films on their basis, chemically deposited from solution*
*2011 professor*

**Maarif A. Jafarov - Baku State University**

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**M. A. Jafarov or M.A. Dzhafarov | Prof. | Baku State University, Baku ...**

*https://www.researchgate.net/profile/M_Jafarov_Or_Ma_Dzhafarov*

## COMPLETE PROFESSIONAL BACKGROUND

From 11.2005 to present: Chief research scientist, Institute for Physical Problems, Baku State University, Baku
From 01.1994 to 11.2005: Head of the Solid State Electronics Lab., Baku State University
From 09.1982 to 01.1994: Senior research scientist, Institute of Photoelectronics, Azerbaijan National Academy of Sciences, Baku
Solid State Electronics, "Semiconductor physics", Nanotechnology
1. 2001: Nasirov Elshan**,** "Physical Electronics", Baku State University
2. 1998: Nasibov Ilgar, "Physical Electronics" Institute of Photoelectronics, Azerbaijan National Academy of Sciences

Electronic properties of p- CdS films, p- type characteristics of Cu- doped CdS, effect of heat treatment on electrical and electrophysical properties of the p-CdS films.

In the sandwich structure of Al-CdS films at presence of intermediate $Al_2O_3$ layer is observed effect of switching as steady conditions of conductivity, which in some approach can be considered as prebreakdown and after breakdown conditions. The results of researches of the current carrying mechanism in structure Al-CdS, made by a method of deposition from a water solution on a hot substrate are given. It is established, that presence of **the nanosize inverse layer of p-type CdS** with high concentration of holes, controlled by technological conditions of film deposition, causes the formation of reverse-biased p-n transition, in parallel Al-n-CdS barrier.

Have been investigated the **negatron phenomenons** in thin films $Cd_{1-x}Zn_xS$, $Cd_{1-x}Zn_xSe$ and $CdS_{1-x}Se_x$. Various negatron phenomena, including, nonlinear current-voltage characteristics such as negative differential resistance, negative photoconductivity, negative differential photoconductivity and the negative photocapactor effect, found out in films $Cd_{1-x}Zn_xS$, $Cd_{1-x}Zn_xSe$ and $CdS_{1-x}Se_x$ depending on technological modes of deposition, anion and kation replacements and under condition of interaction with an atmosphere, explains by the uniform electronic-molecular mechanism. Negative photoconductivity is a function of the sizes of intercrystalline barriers and **nanocrystallites**. Negative differential photoconductivity is caused with formation of nanosize electrical domains, and the negative photocapacity – with change of a charging condition of the **nanoclusters**.

The investigation of electronic properties of $A^2B^6$ type solid solution films has gained the special urgency. It, first of all, is bound to a unique opportunity of making on their basis of a series of essence new devices of a solid-state electronics with a broad spectrum of photoelectric properties due to variation of a composition and structural perfection. The results of investigations of mechanisms of photochemical reactions detected in $Cd_{1-x}Zn_xS$, $Cd_{1-x}Zn_xSe$ and $CdS_{1-x}Se_x$ films, obtained by a method of chemical deposition from water solution on sitall, glass, quartz and aluminium substrates depending on technological mode of deposition and heat treatment are given. In a broad range of a temperature variation, wave length and the light intensities are investigated their photoelectric properties, peculiar latent photoelectric memory and photochemical reaction. Wide-band films $Cd_{1-x}Zn_xS$, $Cd_{1-x}Zn_xSe$ and $CdS_{1-x}Se_x$ possess the high photosensitivity and are perspective materials for creation of sources and receivers of a radiation in the visible and infrared spectral regions. Present work devotes to results of investigations of some electrical properties of Ni- $Cd_{1-x}Zn_xS$, Ag- $CdS_{1-x}Se_x$, Al- $Al_2O_3$- $Cd_{1-x}Zn_xSe$ barriers.

Investigations of some electrical and photoelectrical properties of $Si/ZnS_{1-x}Se_x$ , $Cu_2S$-$Cd_{1-x}Zn_xS$, $Cu_2Se$-$Cd_{1-x}Zn_xSe$, $Cd_{1-x}Zn_xS$-$CdS_{1-x}Se_x$, $Cd_{0.4}Zn_{0.6}S/CdSe_{0.5}Te_{0,5}$., p-CdS/n-CdS/n-CdZnSSe p-GaAs/n-$Cd_{1-x}Zn_xS_{1-y}Te_y$/ZnO, heterojunctions, nano-Structured glass/ $SnO_2$/ $TiO_2$/ $Cd_{1-x}Zn_xS_{1-x}$ $Te_y$/ CdTe/ graphite Thin Film Solar Cells, manufactured by a method of chemical deposition from water solution are given. Ternary $Cd_{1-x}Zn_xS$, $Cd_{1-x}Zn_xSe$ and $CdS_{1-x}Se_x$ is considered to be a promising materials for solar cell applications because of its high optical absorption coefficient, as well as its versatile optical and electrical properties which can, in principle, be purposefully controlled by variation of its composition, heart-treatment temperature and time. As is known, thin film solar cell technology offers the best hope for obtaining photovoltaic devices with low cost and reasonable efficiency. One of the fabrication methods for preparing such thin films.

## PRESENT RESEARCH INTERESTS

Electronic properties of $A^2B^6$ type solid solution films, Heterojunctions of $A^2B^6$ type solid solution films for solar cell, negatron phenomenons, nanocrystallites, Electrochemical deposition, Nanotechnology.

## LIST OF SELECTED PUBLICATIONS


1. **M. A. Jafarov*, E. F. Nasirov, and R. S. Jafarli Growth and Optical Properties of Nanostructured ZnS:Mn Films.** *Inorganic Materials, 2017, Vol. 53, No. 1, pp. 39–44. © Pleiades Publishing, Ltd., 2017. Original Russian Text © M.A. Jafarov, E.F. Nasirov, R.S. Jafarli, 2017, published in Neorganicheskie Materialy, 2017, Vol. 53, No. 1, pp. 15–20.*

2. **A. G. Kyazym-zade, M. A. Jafarov*, E. F. Nasirov, C. A. Jahangirova, and R. S. Jafarli Specific Features of ZnCdS Nanoparticles Synthesized in Different Solvents.** *Semiconductors, 2017, Vol. 51, No. 4, pp. 454–457. © Pleiades Publishing, Ltd., 2017.*
*Original Russian Text © A.G. Kyazym-zade, M.A. Jafarov, E.F. Nasirov, C.A. Jahangirova, R.S. Jafarli, 2017, published in Fizika i Tekhnika Poluprovodnikov, 2017, Vol. 51, No. 4, pp. 477–480.*

3. M.A. Jafarov, I.S. Hasanov, H.M. Mamedov, E.A. Khanmamadova
**Electrical and photoelectrical properties of heterojunctions p-Si/ZnSe0.8Te0.2, prepared by the method of electrochemical deposition. Massachusetts Review of Science and Technologies № 1 (13), January - June, 2016, ELSEVİER**

4. M.A.JAFAROV, E.F.NASIROV, S.A. JAHANGIROVA, R.C.JAFARLI
**PHOTOELECTRIC PROPERTIES OF THIN FILM HETEROJUNCTIONS.** International Journal of Engineering Research and General Science Volume 4, Issue 1, January-February, 2016. ISSN 2091-2730

5. **M. A. Dzhafarov, E. F. Nasirov, and R. S. Dzhafarli**
**Preparation and Optical Properties of Nanostructured ZnS:Cu Films.** *Glass Physics and Chemistry, 2016, Vol. 42, No. 4, pp. 421–425. © Pleiades Publishing, Ltd., 2016.*
*Original Russian Text © M.A. Dzhafarov, E.F. Nasirov, R.S. Dzhafarli, 2016, published in Fizika i Khimiya Stekla*

6. **M. A. Dzhafarov, E. F. Nasirov, and R. S. Dzhafarli**
**Synthesis and Optical Properties of Nanostructured ZnS:Mn Films.** *Nanotechnologies in Russia, 2016, Vol. 11, Nos. 5–6, pp. 344–348. © Pleiades Publishing, Ltd., 2016.*
*Original Russian Text © M.A. Dzhafarov, E.F. Nasirov, R.S. Dzhafarli, 2016, published in Rossiiskie Nanotekhnologii, 2016, Vol. 11, Nos. 5–6.*

7. M.A. Jafarov, E.F. Nasirov, S.A.Jahangirova, R.Jafarli
**Al/CZTS/ZnS solar cells**
International Journal of Engineering Research and General Science Volume 3, Issue 4, July-August, 2015, ISSN 2091-2730 www.ijergs.org

8. M.A. Jafarov, E.F. Nasirov, S.A.Jahangirova
**Nano-CdS/ porous silicon heterojunction for solar cell** International Journal of Scientific & Engineering Research, Volume 6, Issue 7, July-2015 849 ISSN 2229-5518 IJSER © 2015 http://www.ijser.org

9. M. A. Jafarov, E. F. Nasirov, S. A. Jahangirova, R. Jafarli
**NanoZnS thin films for solar cell**
NANOSYSTEMS: PHYSICS, CHEMISTRY, MATHEMATICS, 2015, 6 (5), P. 644–649

**DOI 10.17586/2220805420156564649**

*10.***M. A. Jafarov Electron Properties of p_CdS Films,** *Nanotechnologies in Russia, 2014, Vol. 9, Nos. 9–10, pp. 480–484. © Pleiades Publishing, Ltd., 2014. Original Russian Text © M.A. Jafarov, 2014, published in Rossiiskie Nanotekhnologii, 2014, Vol. 9, Nos. 9–10*

*11.* **Maarif Ali Jafarov, Elshan FayazNasirov, Rovshan Mammadov, FABRICATION AND CHARACTERIZATION p-CdS NANOWIRE.** *International Journal of Latest Research in Science and Technology* **ISSN (Online):2278-5299** *Volume 3, Issue 6: Page No.6-9 November-December 2014, http://www.mnkjournals.com/ijlrst.htm*

12. M. A. Jafarov, E. F. Nasirov, R. Mammadov, R. Jafarli
**FABRICATION AND CHARACTERIZATION ZnCdS NANOWIRE.** NANOSYSTEMS: PHYSICS, CHEMISTRY, MATHEMATICS, 2014, 5 (6), P. 796–802

**13. M.A. Jafarov E.F. Nasirov**
**PHOTOELECTRIC PROPERTIES OF THIN FILM p-CdS/n-CdS/n-CdZnSSe HETERO JUNCTIONS**
International Journal on "Technical and Physical Problems of Engineering" (IJTPE), June 2014 Issue 19 Volume 6 Number 2 Pages 71-75

*14. . M.A.Jafarov, E. F. Nasirov , R.Jafarli,* Generation of $Cd_{1-x}Zn_xS$ nanoparticles by laser ablation in liquids. ***Proc. SPIE* 9170, Nanoengineering: Fabrication, Properties, Optics, and Devices** XI, 917015 (August 28, 2014); doi:10.1117/12.2061219

*15. M.A.Jafarov, E. F. Nasirov* , Investigation p-$CuInGaSe_2$/n-$Cd_{1-x}Zn_xS$ heterojunctions obtained by electrochemical deposition. **International Journal of Engineering Science and Innovative Technology (IJESIT) Volume 3, Issue 5, 2014, pp 418-424**

*16. M.A.Jafarov, E. F. Nasirov,* Preparation of Nanosized CZTS Structures for Solar Cells, **International Journal of Engineering Innovation Research, Volume 3, Issue 6,** ISSN: 2277 – 5668, pp741-745

*17. M.A.Jafarov, E. F. Nasirov,* $Cu_2ZnSnS_4$ thin film solar cells. **International Journal of Scientific Research**, 2014,Vol 3, pp354-356

*18. M.A.Jafarov, E. F. Nasirov,* Fabrication and Characterization p-CdS nanowire, **International Journal of Latest Research in Science and Technology**

*19. M.A.Jafarov, E. F. Nasirov,* Photoelectric properties of thin film p-CdS/n-CdS/n-CdZnSSe heterojunctions. **International Journal on "Technical and Physical Problems of Engineering**" (IJTPE), 2014, Issue 19, Vol. 6, Number 2, P. 71-75

*20. M.A. Jafarov, E.F. Nasirov, S.A. Mamedova*, Neqative photoconductivity in thin films of $A^{II}B^{VI}$ solid solutions. **Semiconductor,** 2014, V. 48, 5, pp.590-596

*21. M.A.Jafarov, E. F. Nasirov* Negatron effects in $CdSe_{1-x}Te_x$ and $ZnS_{1-x}Se_x$ films Journal of Surface Investigation X-ray Synchrotron, 2014, № 2, c.1-7

*22. M.A.Jafarov, E. F. Nasirov*, Photoconductivity of solution-grown films of II–VI based solid solutions Inorganic Materials, 2013, V 49, № 11, pp. 1168-1172

*23. M.A.Jafarov, E. F. Nasirov* Nanoscale Structures based on the $Zn_{1-x}Cd_xS$. **Nanosystems: physics, chemistry, mathematics**, 2013, 4 (5), P. 680-689

*24. M.A.Jafarov, E.F.Nasirov.* Preparation of Nanosized A2B6 Compound Multilayer Structures for Solar Cells. **Universal Journal of Physics and Application** 1(2): 125-129, 2013

*25. M.A.Jafarov, E. F.Nasirov* Peculiarities of ZnCdSe Nanolayers by Chemical

Deposition. **Journal of Chemistry and Chemical Engineering**, 7(2013) 402-408

*26. M.A. Jafarov, E.F. Nasirov, S.A. Jahangirova, E.A. Khanmammadova,* **Photochemical reaction in $A^2B^6$ films, deposited from water solution, Condenced matter and interphases**, **V. 15, N. 3, 2013.** pp. 260-265,

*27. M.A.Jafarov, E. F.Nasirov,* Properties of the thin-film solar cells with heterojunctions $Cu_2S$- $Cd_{1-x}Zn_xS$ and $Cu_2Se$-$Cd_{1-x}Zn_xSe$. **Proceeding of SPIE 8470, Thin Film Solar Technology** IV, 84700l

28. A.S.Abdinov, M.A.Jafarov, S.M.Mamedova, E.F.Nasirov,
Functionalities of the $CdSe_{1-x}Te_x$ films, deposited from a water solution, in IR region of a spectrum, **Applied Physics (Russia) v.3, c.94-97, 2008,**

29. A.S.Abdinov, M.A.Jafarov, S.M.Mamedova,
Photoelectrical properties of the CdZnS thin films, deposited from solution.
**Inorganic Materials, 2007, v.43, №.3. p.311-313.**

30. Abdinov A.Sh., Jafarov M.A., Nasirov E.F., Mammadova S.A.
Solar Cells on the base of $Cd_{1-x}Zn_xS/CdSe_{1-x}Te_x$ heterojunctions.
**Internatıonal Conf. on Technical and Physical Problems in Power Enginering. TPE-2006, Ankara, Turkey.**

31. M.A.Jafarov, E.N.Zamanova, H.M.Mamedov
**Proc. SPIE, v. 4467, p. 186-194, 2003 and Applied Physics (Russia) v.3, c.94-97, 2004.**

32. A.S.Abdinov, M.A.Jafarov, H.M.Mamedov, E.F.Nasirov
*Functionalities of the $Cd_{1-x}Zn_xSe$ films, deposited from a water solution, in IR region of a spectrum* **Proc. SPIE, v. 4467, p. 202-205, 2003 and Applied Physics (Russia) v.4, p.84-89, 2004.**

*33. M.A.Jafarov Photoconductivity $Cd_{1-x}Zn_xS$ films, deposited from a water solution* **Second International Conf. on Technical and Physical Problems in Power Engineering. Tabriz, Iran, p.408-410, 2004.**

34. M.A.Jafarov
*Photoreceivers of JR radiation on the bases of CdSe:Cu films deposited from solutions*
**Proc. of SPIE, v.4340, p.121-124, 2000 and Applied Physics (Russia) v.6, p.68-73, 2000.**

35. A.S.Abdinov, M.A.Jafarov, N.M.Mekhtiev
*Photosensitivity of the CdSSe films near the JR region*
**Proc. of SPIE, v.4340, p.107-111, 2000 and Applied Physics (Russia) v.6, p.63-67, 2000.**

36. A.S.Abdinov, M.A.Jafarov, E.F.Nasirov
*Photoconductivity of CdZnSe films in IR region deposited from solution*
**Proc. of SPIE, v.4340, p.112-116. and Applied Physics (Russian) v.6, p.56-62, 2000.**

37. E.K.Guseynov, M.A.Jafarov, I.Nasibov
*Noise characteristic of CdZnS films*
**Turkish journal of Physics, v.21, N2, p.206-211, 1997.**

38. M.A.Jafarov
*Effect of heat treatment on electrical and electrophysical properties of the CdS*
**Semiconductor physics and Technology. p.1234-1239, 1999.**

39. M.A.Jafarov
*About the mechanism conductivity in this films diode structures based on the bases of*

*CdZnS* **Journal of Physics, Condensed Matter, p. 984-986, 1999.**

40. M.A.Jafarov, H.M.Mamedov

*Recombination processes in CdZnS Recombination processes in CdZnS*

**Journal of Physics, Condensed Matter, p. 984-986, 1999.**

41. M.A.Jafarov

*Photoelectrical properties of the CdZnS thin films, deposited from solution*

**Inorganic materials**, **v.35, N.11, p.1307-1312, 1999.**

42. M.A.Jafarov

*Spectral memory in CdZnS thin films*

**Inorganic materials, v.35, N 3, p.300-302, 1999.**

43. M.A.Jafarov

*Negative photoconduction in the CdZnS thin films*

**Inorganic materials, v.34, N9, p.1034-1036, 1999.**

44. E.N.Zamanova, M.A.Jafarov

*IR optical filter based on the copper doped CdS single crystals*

**Instrument and experimental techniques, v.38, N 1, p.84-85, 1995.**

45. E.N.Zamanova, M.A.Jafarov

*Effect of photomemory in high-resistance CdS:Cu single crystals.* **Physics and techniques of semiconductors**, **(Russia) v.29, N8, p.1411-1413, 1995.**

46. M.A.Jafarov

*Effect of switching in single crystals ($In_2Te_3$) u (FeTe)*

**Inorganic materials, v.32, N1, p.34-35, 1996.**

47. A.S.Abdinov, M.A.Jafarov, R.M.Rzayev

*The effect of doping by Dy on photoelectrical properties of GaSe*

**Inorganic materials, v.35, N4, p.410-412, 1999.**

48 A.S.Abdinov, M.A.Jafarov, R.M.Rzayev

*Intrinsic defects and Dy impurities in GaSe*

**Inorganic materials, v.34, N3, p.271-273, 1996.**

49. A.S.Abdinov, M.A.Jafarov, H.M.Mamedov, E.F.Nasirov

*Photoconductivity $Cd_{1-x}Zn_xS$ films, deposited from a water solution*

50. E.K.Guseynov, M.A.Jafarov, I.Nasibov

*Characteristics of CdS:Cu photosensitive films*

**Turkish journal of Physics, v.21, N2, p.206-211, 1997.**

51. E.K.Guseynov, M.A.Jafarov

**Turkish journal of Physics, v.21, N12, p.1255-1261, 1997.**

## INTERNATIONAL CONFERENCES, SYMPOSIUMS

**2017 Modern Trends in Physics:** Program and Abstracts of International Conference, 20−22 April 2017, Baku State University. – Baku:

2016 Global Conference on Polymer and Composite Materials (PCM 2016)

*2016, 13th International Conference* on Nanosciences &Nanotechnologies – *NN16*

Porto Palace Conference Centre & Hotel, 5-8 July 2016, Thessaloniki, Greece

*2015 9th* International Physics Conference of the Balkan Physical Union 24-27 August 2015, İstanbul University, İstanbul / Turkey

2014, Thessaloniki, Greece, 11th International Conference on Nanosciences & Nanotechnologies–

NN14

2013, France, PVTC, Thin Films.Advanced Silicon Solution, 21-23 may

2013, Saint Petersburg, Mathematical challenge of quantum transport in nanosystems International Conference, March 12 – 15,

2013, SPIE Optics+Photonics NanoScience NanoEngineering Conference 8818 · Functional Nanostructured Thin Films

2013, Tenerife, Spain, The Twenty-first Annual International Conference on composites/nano engineering (ICCE-21) July 21-27,

2013, Istanbul, Turkey, The 9th International Conference on "Technical and Physical Problems of Electrical Engineering" (ICTPE-2013), Isik University & Istanbul Technical University, 9-11 September 2013

2013, Thessaloniki, Greece, 10th International Conference on Nanosciences & Nanotechnologies– NN13

2012, Edinburgh,The 24th Conference of the EPS Condensed Matter Division (CMD-24), 3 - 7 September

2012, France,Photovoltaic technical conference – thin film & advanced silicon solutions

2012, Hong-Kong, International Conference on Power and Energy Systems. *Lecture Notes in Information Technology*

2012, Kyiv, Ukraine ELNANO' 2012, April 10-12,

2012, Warsaw, Poland, E-MRS Fall Meetings on September 17-21,

2012 San Diego, California, USA SPIE-Optic+Photonic 2012, Thin Film Solar Technology 12 - 16 August

2012, Technical and Physical Problems of Power Engineering, İCTRE-2012,

2012, Chisinau, Moldova, 6th Interntional Conference on Materials Science and Condensed Matter Physics (MSCMP 2012)

2012, Alushta, Nanomaterials: Applications & Properties (NAP-2012) : 2-nd International conference,

2012, Zvenigorod, Russia. The International Conference "Micro- and Nanoelectronics – 2012" (ICMNE-2012) with the Extended Session "Quantum Informatics" (QI-2012) and the Workshop "Silicon-on-Insulator" October 1-5,

2011, Strasbourg, France, EMRS – Engineering of wide bandgap semiconductor materials for energy saving, 09 May

2011, Strasbourg, France, EMRS – Advanced inorganic materials and concepts for photovoltaics. 12 May

2011, Tbilisi, Georgia International Scientific Conference Philosophy and Synergy of Information,

2009, Ulyanovsk, Russia; XI International Conference on the optical-nanoelectronics, nanotechnology and microsystems

2008, Ulyanovsk, Russia; X International Conference on the optical-nanoelectronics, nanotechnology and microsystems

2007, Ulyanovsk, Russia; IX International Conference on the optical-nanoelectronics, nanotechnology and microsystems

2006, Ulyanovsk, Russia; VIII International Conference on the optical-nanoelectronics, nanotechnology and microsystems.

2006, Moscow, Russia; XIX International Science-Technical Conference on Photoelectronics and night vision devices.

2006, Strasbourg, Thin film and nanostructured materials for photovoltaics. E-MRS Spring Meeting.

2006, Ankara, Turkey; Third International Conference on Technical and Physical Problems in Power Engineering

2005, Strasbourg, France; E-MRS Spring Meeting, Thin film and nanostructured materials for photovoltaics

2004, Ulyanovsk, Russia; VI International Conference on the optical-nanoelectronics, nanotechnology and microsystems.

2004, Moscow, Russia; XVIII International Science-Technical Conference on Photoelectronics and night vision devices.

2004, Taganrog, Russia; The actual problems of the sold-state electronics and microelectronics

2004, Baku, Light in nanosize solide. 1 International Scientific Seminar,

2003, Strasbourg, France; E-MRS Spring Meeting, Thin film and nanostructured materials for

photovoltaics

2002, Edinburgh, UK; 26th International Conference on the Physics of Semiconductors

2002, Baku, Azerbaijan; First International Conference on Technical and Physical Problems in Power Engineering

2002, Moscow, Russia; XVII International Science-Technical Conference on the Photoelectronics and night vision devices.

2002, Taganrog, Russia; The actual problems of the sold-state electronics and microelectronics

2000, Santa Barbara, USA; Second International Conference on Inorganic Materials

2000, Moscow, Russia; XVI International Science-Technical Conference on Photoelectronics and night vision devices

1999, Chernovts,Ukraine, Physical problems in material science of semiconductors.

1999, Baku, Azerbaijan, Second International symposium on Mathematical computational applications.

1997 Chernivitsi, Physical problems in material science of semiconductors .

1997, Ulyanovsk, Russia; International Conference on the deep level centers in semiconductors

1994, Taiwan, Seventh International Conference on solid films and surfaces.

1991, Ashkabad, Turkmenistan; The Conference on Photoelectrical phenomena in semiconductors

1990, Kaluga, Russia; V-International Conference on physical processes in the semiconductor heterojunctions