

# **EMIRULLAH M. MEHMETOV**

## **(AMIRULLAH M.MAMEDOV)**

**Professor Emirullah Mehmetov**

**Bilkent University, NANOTAM (Nanotechnology Research Center )**

Bilkent Ankara Turkey 06800

Phone +90.312.29030-50/ ext. 1446

Fax +90.312.312.2664042

E-mail: [mamedov@bilkent.edu.tr](mailto:mamedov@bilkent.edu.tr)

***Born:*** July 24, 1946 (Baku, Azerbaijan, USSR)

***Citizenship:*** Turkey, Azerbaijan

***Interests:***

- **Optics (include Nonlinear Optics and Laser Physics)**
- Optical and Electrooptical Properties of Nonlinear Materials (Ferroelectrics, Topological Insulators, Metamaterials, Photonic Crystals)
- **Photonics, Optical Information Technology, Guidance Systems, Artificial Neural Network**
- Electronic Structure Calculations of Nonlinear Materials( ab initio)

***Languages:*** English (fluently), Turkish (fluently), Russian (fluently), Azerbaijanian (fluently)

***Education:***

**1974 Academic Degree : Ph.D in “Physics and Mathematics” from the A.F.Ioffe Physical.-Technical. Institute of the Academy Sciences of the USSR (now Russian Academy of Sciences – RAS), St.Petersburg, Russia (diploma FM No 000479 from Supreme Attestation Committee of the USSR, 11.02.1975 and were nostrificated (equivalency) by Inter University Board of the Council of the Higher Education of Turkey, Ankara, Turkey),**

Thesis: Optical and Electrooptical Properties of Photoferroelectric Materials”. Ph.D. Thesis has been performed at the Vavilov State Optical Institute of the Military Industry Department of the USSR and at the Ioffe Physical-Technical Institute.

**Thesis supervisor : fellow member of the Russian Academy of Sciences Smolenskii G.A.**

1980 Senior Researcher's Academic Degree International Certificate in Solid State Physics from Supreme Attestation Committee of the USSR (diploma SN No017205); Academic Degree "Associate Professor of Physics from Baku State University, Azerbaijan.

**1988 – Academic Degree : The Habilitation Degree of Doctor of Sciences in Physics and Mathematics. ( The highest academic degree in the USSR and Eastern European Countries, next after Ph.D. There is no similar academic degree in the USA) from Regional Council of Physics and Mathematics of the Supreme Attestation Committee of the USSR in Riga, Latvia ( diploma FM No 004888)**

Thesis : VUV Spectroscopy and Electron States of the Oxygen-Octahedron and Oxygen-Tetrahedron Noncentrosymmetric Materials

**1989 - Academic Degree : Full Professor in "Optics" from Supreme Attestation Committee of the USSR, Moscow, Russia (certificate PR No 009472 were nostrificated (equivalency) by Inter University Board of the Council of the Higher Education of Turkey, Ankara, Turkey).**

#### ***Employment:***

- **Junior Researcher(Visiting), Researcher, Vavilov State Optical Institute of the Military Industry Department of the USSR, St. Petersburg, USSR**
- **Researcher, Senior Researcher, Ass.Prof. , Prof., State University of Baku, Azerbaijan**
- Visiting Senior Res., University of Nebraska-Lincoln .
- **Full Professor - Head of Nonlinear Optics Division, Baku State University, Azerbaijan**
- Visiting Senior Researcher Tsukubo Scientific Center, Japan
- **Visiting Professor, Department of the Electrical and Electronics Engineering, University "La Sapienza" (First Rome University), Rome, Italy**
- Professor of the Physics and Electrical and Electronics Engineering Departments, Cukurova University 1991 – 2011 (also, Scientific Advisor of the Microelectronics, Guidance, Electrooptics (MGEO) Div. of the Military Electronic Industry of Turkey, -- ASELSAN, Inc., Advisor of SAVTAG TUBITAK and SATEM Branch Ministry of National Defence of Turkey )
- **Emeritus professor - Senior Researcher, Nanotechnology Research Center (NANOTAM) , Bilkent University, 2011 – up to now**

#### ***Honour and Awards***

- **State Prize, 1988 (USSR, Azerbaijan)**
- Fellow of the Turkish Physical Society

***Publications: more than 250 publications in international journals (JETP, Phys. Sol. State, J.Phys., Appl.Phys., Physica, Phil.Mag., J.Phys.Soc.Jpn., Jpn. J. Appl. Phys., Phys. Stat. Sol., J. Optics, Mat. Res.Bull., J.Electron Spectr., J. Quant. Spectroscopy, Key Eng. Mat.,***

*Ferroelectrics, JOAM, CEJP; below publications from 2001 up to now) : in all publications my name is Amirullah M.MAMEDOV*

**in: Optics, Solid State Physics, Optoelectronics and Material Science (Theory and Experiments).**

- 1. Mie Scattering and Domain Structure of Ferroelectrics, Ferroelectrics, 270, 1501 (2002)**
2. Electronic Structure and Phase Transition Effects in Some ABO<sub>3</sub> Materials. Ferroelectrics, 270, 1495 (2002)
- 3. Formation Dynamic of Clouds and Mie Scattering Theory”, Balkan Physics Letters, Vol. 10(3), 146(2002)**
4. Anisotropy of Induced Birefringence in Ferroelectrics with Pseudoilmelite Structure, Jpn. J. Appl. Physics, 42 (1), 140 (2003)
- 5. Light Scattering in Relaxor Ferroelectrics due to Domain Structure, Ferroelectrics, 283, 87 (2003)**
6. Cluster *ab initio* Calculation of the Shape of Local Potential well and of Positions for Oxygen Atoms in PCN (C=Cd). Ferroelectrics, 283, 61 (2003)
- 7. Mie Scattering in Ferroelectrics with Diffuse Phase Transitions, Ferroelectrics, 291, 177 (2003)**
8. Polarization Induced Electronic Processes in a Quantum Well, Ferroelectrics, 296, 221 (2003)
- 9. Electret States in Some Electrooptical Materials, Ferroelectrics, 296, 117 (2003)**
10. Optical Neural Network Architecture in Photoferroelectrics, Ferroelectrics, 296, 83 (2003)
- 11. Light Scattering in Some Order-Disorder Type Ferroelectrics due to Phase Transitions, Ferroelectrics, 296, 29 (2003)**
12. Harmonic Oscillator Model and Determination of Optical Parameters, J. Quantitative Spectr. And Rad. Transfer, 86 (2), 223 (2004)
- 13. Trapping Parameters of Repulsive Centers in SbSI Single Crystals, Materials Res. Bull. 39 (7-8), 1065 (2004)**
14. Features of the Polarization Induced Electronic Processes in a Nonlinear Quantum Well, Ferroelectrics, 301, 107 (2004)
- 15. KNbO<sub>3</sub> Based Neural Network System, Ferroelectrics, 301, 97 (2004)**
16. Absolute Refractive Index and Oscillator Model of Dispersion for Some Ferroelectrics with Pseudoilmelite Structure, Ferroelectrics, 304, 997 (2004)
- 17. Optical Function of LiNbO<sub>3</sub> and Nb<sub>2</sub>O<sub>5</sub> Transparent Thin Films, Ferroelectrics, 304, 961 (2004)**
18. Optical Properties (VUV Region) of ABO<sub>3</sub> Ferroelectrics : Application of Synchrotron Radiation, Ferroelectrics, 303, 739 (2004)
- 19. Investigation on the Structure of PLZT Ceramics due to Light Scattering, Key Engineering Materials, 264-268 (1-3), 1297 (2004)**
20. Cluster *ab initio* Modeling of Local Lattice Instability in Relaxor Ferroelectrics, Phys. Solid State, 46 (9), 1717 (2004)
- 21. Phase Transition and Energy Spectra of Some Ferroelectrics-Ferroelastics, Ferroelectrics, 307, 45 (2004)**
22. Light Scattering in Ferroelastic Lead Phosphate-Type Crystals due to Domain Structure, Ferroelectrics, 307, 39 (2004)
- 23. Argand Diagram and Oscillation Description of Electron State in Ferroelastic Crystals, Ferroelectrics, 307, 19 (2004)**
24. Ferroelectric Based Pyroionization IR converter, Ferroelectrics, 320, 617 (2005)
- 25. Effects of Polarization on Ferroelectric P-N Junction, Ferroelectrics, 320, 567 (2005)**
26. *Ab initio* Calculation of Band Structure and Linear Optical Properties SbSI in para- and ferroelectric phases, Central Eur. J. Physics, 5(1), 25 (2007)

27. **Ab initio Calculations of the Electronic Structure and Linear Optical Properties, Including Self-Energy Effects, for Paraelectric SbSI, J. Physics – Cond. Matt., 19(11) 116207 (2007),**
28. Ferroelectric Based Multilayered Anti-Reflection Coating System, Optoelectronics and Adv. Materials-Rapid Comm., 1 (8), 408, 2007
29. **Electronic and Optical Properties of KTaO<sub>3</sub>: Ab initio calculation, Physica B – Cond. Matt. 394, 81 (2007)**
30. Linear and Nonlinear Optical Properties of SbSI: First Principle Calculation, Ferroelectrics, 352, 396 (2007)
31. **Band Structure and Optical Properties of SbSeI: Density Functional Calculation, Phys. Stat. Sol. (B), 244 (10), 3673 (2007)**
32. Band Structure and Optical Properties of Antimony-Sulfobromide: Density Functional Calculation, Central Eur. J. Physics, 6(1), 64 (2008)
33. **Influence of the Layer Thickness on the Stress Distribution on Ceramic-Cement Dentin Bilayer Systems, Dental Materials J. 27(4), 826 (2008)**
34. Stress Distribution and Damage Mode of Ceramic Dentin Bilayer Systems, Modern Phys. Lett. (B), 22(13), 1317(2008)
35. **Fiber-optic magnetic-field and electric-current sensors based on the Faraday effect in Bi<sub>12</sub>GeO<sub>20</sub> and Bi<sub>12</sub>SiO<sub>20</sub> crystals, J. Commun. Techn.& Electr. 53(3) 347 (2008)**
36. Linear and Nonlinear Optical Susceptibilities in Some Ferroelectrics: *ab initio* calculation. Int. J. Nanoelectronics and Materials. 3, 53 (2010).
37. **Band Structure and Optical Properties of Some quasi molecular Al<sub>3</sub> (A = Sb, Bi, As). Int. J. Nanoelectronics and Materials. 3, 37 (2010)**
38. Electronic Band Structure and Optical properties of Sb<sub>2</sub>S<sub>3</sub> and Sb<sub>2</sub>Se<sub>3</sub>: *ab initio* calculation, Fizika (Baku Azerbaijan) 16(2), 107 (2010)
39. **The Elastic, Electronic and Optical Properties of PtSi and PtGe Compounds. Philosophical Mag. 91(23), 3093 (2011).**
40. Band Structure and Optical Properties of BiOCl: Density Functional Calculation, Gazi University Journal of Science, 25(1), 9 (2012)
41. **First Principles Prediction of the Elastic, Electronic and Optical Properties of Sb<sub>2</sub>S<sub>3</sub> and Sb<sub>2</sub>Se<sub>3</sub> Compounds, Solid State Sci., 14(8), 1211 (2012)**
42. Optical properties and Electronic Band Structure of Topological Insulators: on A<sub>2</sub>B<sub>3</sub> compounds based, Ferroelectrics , 448(1), 29 (2013)
43. **Modeling and Simulation of the Ferroelectric Based Micro-Gyroscope: FEM Analysis, Ferroelectrics, 447(1), 46, (2013)**
44. 2D Ferroelectric Photonic Crystals: Optics and Band Structure, Ferroelectrics, 448(1), 23 (2013)
45. **2D Anisotropic Photonic Crystals of Hollow Semiconductor Nanorod with Liquid Crystals, Applied Mechanics and Materials, 394(1), 38 (2013)**
46. Electron Energy-Loss Spectroscopy and the Electronic Structure of Some Ternary Oxides: First Principle Calculations, Azerbaijan J. Physics, 19(2), 61 (2013)
47. **Structural, Electronic, and Optical Properties of Ag<sub>2</sub>Se and Ag<sub>2</sub>Te Compounds: A First Principles Study, Azerbaijan J. Physics, 19(2), 67 (2013)**
48. Structural, Elastic, and Electronic properties of Topological insulators: Sb<sub>2</sub>Te<sub>3</sub> and Bi<sub>2</sub>Te<sub>3</sub>, IEEE 2013 Joint UFFC, EFTF and PFM Symposium Proceeding, p. 41 (ISAF/PFM-IEEE catalog number CFP131SA – ISBN 978-1-4673-5994-8)
49. **Linear and Non-linear Optical properties of AgBO<sub>3</sub> (B=Nb, Ta): first principal study, IEEE 2013 Joint UFFC, EFTF and PFM Symposium Proceeding, p. 45 (ISAF/PFM-IEEE catalog number CFP131SA – ISBN 978-1-4673-5994-8)**
50. One and Two Dimensional LiNbO<sub>3</sub> Photonic Crystals, IEEE 2013 Joint UFFC, EFTF and PFM Symposium Proceeding, p. 49 (ISAF/PFM-IEEE catalog number CFP131SA – ISBN 978-1-4673-5994-8)
51. **Electron Energy Loss Spectroscopy and the Electronic Band Structure of KNbO<sub>3</sub> Ferroelectric, Ferroelectrics, 461(1), 1 (2014)**

*Conferences (more than 50 international conferences, meetings and workshops, below some conferences from 2000 up to now) : oral presentations*

- 1) **5<sup>th</sup> International Conference on Light Scattering by Nonspherical Particles (2000, Canada, Halifax)**
  - A. *Light Scattering and Domain Structure of Some Ferroelectrics*
  - B. *Scattering Properties of Red Blood Cell (RBC),*
- 2) **First International Space Symposium "Global Space Activities and Potential in Turkey" (2001, Turkey, Ankara)**  
*Infrared Pyroelectric Detector for Imaging Processor.*
- 3) **10<sup>th</sup> International Meeting on Ferroelectricity, (2001, Spain, Madrid)**
  - A. *Electronic Structure and Phase Transition Effects in Some ABO<sub>3</sub> Materials*
  - B. *Mie Scattering and Domain Structure of Ferroelectrics.*
- 4) **International Conference on Artificial Intelligence in Engineering and Technology, ICAIET-2002 (2002, Malaysia, Kote, Kinabalu)**  
*Implementation of Neural Networks in a Photoferroelectrics*
- 5) **The 7-th Russia/CIS/Baltic/Japan Symposium on Ferroelectricity (2002, Russia, St. Petersburg)**
  - A. *Cluster ab initio Calculations of a Shape of Local Potential Well and of Positions For Oxygen Atoms in PbCN and BaCN (C=Cd)*
  - B. *Light Scattering in Relaxor Ferroelectrics Due to Domain Structure.*
- 6) **International Joint Conference on the Application of Ferroelectrics 2002 (2002, Japan, Nara)**  
*Anisotropy of Induced Birefringence in Ferroelectrics with Pseudoilmelite Structure.*
- 7) **6<sup>th</sup> European Conference on Application of Polar Dielectrics, ECAPD-6 (2002, Portugal- Aveiro)**  
*Electret States in Some Electrooptical Materils*
- 8) **International Conference "Electroceramics-VIII" (2002, Italy, Rome)**  
*Light Scattering in PLZT Ceramics Due to Electric Field.*
- 9) **7<sup>th</sup> International Symposium on Ferroic Domains and Mesoscopic Structures (2003, France, Toulon)**  
*Mie Scattering in ferroelectrics with Diffuse Phase Transitions.*
- 10) **Fourth International Seminer on Ferroelastic Physics (2003, Russia, Voronezh)**  
Argand Diagram and Oscillator Description of Electron State in Ferroelectric-Ferroelastics
- 11) **15-th International Conference on Defects in Insulating Materials ICDIM (2004, Latvia Riga)**  
Influence of the phase transition on the electronic structure of the noncentrosymmetric dielectrics
- 12) **10-th European Conference on Ferroelectricity EMF-10, (2003, UK, Cambridge)**  
Optical Properties (VUV Region) of ABO<sub>3</sub> Ferroelectrics : Application of Synchrotron Radiation
- 13) **8-th Conference and Exhibition of the European Ceramic Society, (2003, Turkey, Istanbul)**  
Investigation on the Structure of PLZT Ceramics Due to Light Scattering
- 14) **Condensed Matter Physics Conference of Balkan Countries CMPC-BC 2008**

- (2008, Turkey, Mugla)  
Electronic Band Structure and Optical properties of  $ABO_3$  ferroelectrics
15. **Second International Meeting on Materials for Electronic Applications IMMEA 2009 (2009, Tunisia, Hammamet)**  
Linear and Nonlinear Optical Susceptibilities in Some Ferroelectrics: *ab initio calculation*.
16. **21-st International Symposium on Applications of Ferroelectrics, ISAF-2012, (2012, Portugal, Aveiro)**  
Optical properties and Electronic Band Structure of Topological Insulators: on  $A_2B_3$  compounds based,
17. **11-th European Conference on Applications of Polar Dielectrics, ECAPD-11, (2012, Portugal, Aveiro)**  
Ferroelectric Based Microgyroscope for IMU: Modeling and Simulation
18. **4-th Conference Piezoresponse Force Microscopy and Nanoscale Phenomena in Polar Materials, ( 2012, Portugal Aveiro)**  
2D Ferroelectric Photonic Crystals: Optics and Band Structure, Ferroelectrics
19. **International Ultrasonic Symposium (2013, Czech Republic, Prague)**  
Structural, Elastic, and Vibrational Properties of Topological Insulators (on  $A_2^5B_3^6$  Compound Based)
20. **International Symposium on the Applications of Ferroelectrics (2013, Czech Republic, Prague)**  
Linear and Nonlinear Optical Properties of  $AgBO_3$  (B=Nb, Ta): First Principle Study;  
One- and Two Dimensional Ferroelectric  $LiNbO_3$  Photonic Crystal.
21. **13-th International Meeting on Ferroelectricity (2013, Poland, Katowice – Krakow)**  
Optical Properties in 2D Photonic Crystals of Core-Shell-Type Ferroelectric Nanorod Infiltrated with Nematic Liquid Crystals;  
Electron Energy-Loss Spectroscopy and the Electronic Structure of  $ABO_3$  Ferroelectrics: First Principle Calculations
22. **International Conference “Novel Semiconductor Materials and Structures (2013, Azerbaijan, Baku)**  
Structural, Electronic, and Optical Properties of  $Ag_2Se$  and  $Ag_2Te$  Compounds: A First Principles Study  
Electron Energy-Loss Spectroscopy and the Electronic Structure of Some Ternary Oxides: First Principle Calculations
23. **International Conference on Mechatronics, Applied Mechanics and Energy Engineering - MAMEE 2013 (2013, Singapur).**  
2D Anisotropic Photonic Crystals of Hollow Semiconductor Nanorod with Liquid Crystals