

## Curriculum vitae

Professor Ayşe EROL



## Contact information

Faculty of Science, Physics Department  
Istanbul University, Vezneciler, Fatih, 34134 Istanbul, TURKEY

Phone: +90 212 455 57 00 [Ext. 15005]

Faximile: +90 212 440 00 69

[ayseerol@istanbul.edu.tr](mailto:ayseerol@istanbul.edu.tr) | [ayseerol@gmail.com](mailto:ayseerol@gmail.com)

<http://nano-optoelectronics.org>

## Degrees

1997-2002 PhD. Physics, Istanbul University, Istanbul, Turkey

Thesis Entitled “*An investigation of Bragg reflections in surface emitting low dimensional structures*”

[Supervised by Prof. M. Çetin Arıkan]

1994-1997 MSc. Physics, Istanbul University, Istanbul, Turkey;

Thesis Entitled “*Optical properties of low dimensional semiconductors*”

[Supervised by Prof. M. Çetin Arıkan]

1990-1994 BSc. Physics, Istanbul University, Istanbul, Turkey

## Employment

2013 - Professor, Department of Physics, Istanbul University

2007- 2013 Associate Professor, Department of Physics, Istanbul University

2004 – 2007 Assistant Professor, Department of Physics, Istanbul University

1998 – 2004 Research Assistant, Department of Physics, Istanbul University

## Visiting Positions

June – August 2013 School of Computer Science and Electronic Engineering , University of Essex, Colchester, Essex, UK [**Visiting Professor**]

January – March 2012 School of Computer Science and Electronic Engineering , University of Essex, Colchester, Essex, UK [**Visiting Fellow**]

January – March 2012 School of Computer Science and Electronic Engineering , University of Essex, Colchester, Essex, UK [**Visiting Fellow**]

October 2001- August 2002 Department of Electronic System Engineering, University of Essex, Colchester, Essex, UK [**Visiting Fellow**]

## **Scholarly activities**

2014 Co-director of 31st Turkish Physics Society International Physics Congress, July, 2014

2014- Guest Editor, Nanoscale Research Letters

2013 – Editor, *Material Processing in Semiconductors*

2013 Meeting Organizer, COST Action MP0805 "Novel Gain Materials and Devices Based on III-V-N/Bi Compounds", September 2013

2010-2013 Workgroup Vice-leader of COST Action MP0805 "Novel Gain Materials and Devices Based on III-V-N Compounds"

2010 Organizing Committee Member, Physics and Technology of Solar Cells, May 2010

2010 Organizing Committee Member, COST Action MP0805 "Novel Gain Materials and Devices Based on III-V-N Compounds", April 2010

2010 Organizing Committee Member of the symposium on "Novel Gain Materials and devices based on Nitrogen containing III-V Materials", EMRS International Conference, 7-11 June 2010, Strasbourg, France

2010 Guest Editor, *Physica Status Solidi B*

2010 Guest Editor, *Physica Status Solidi C*

2009 Organizing Committee Member of "Nanomats 2009", Istanbul

2006 Organizing Committee Member of "International Conference on Superlattices, Nanostructures and Nanodevices (ICSNN 2006)", Istanbul

2006 Guest Editor, *Physica Status Solidi C*

2002 Local Organizin Committee Member of "Workshop on Dilute Nitrides", Istanbul

## **Research Areas**

Low dimensional semiconductors, nanostructures based on II-VI compounds, electronic, magneto-transport properties in low dimensional semiconductors, optical characterization, structural characterization (AFM and SEM), design and characterization of optoelectronic devices

## **Supervised Thesis**

3 MSc (completed), 2 PhD (continue), 5 MSc (continue)

## **Membership of Professional Societies**

Turkish Physics Society

## Awards

2004 Nazım Terzioğlu Award

2001 British Chevening Scholarship, British Council

## Computer skills

MS Office programs, Matlab, Mathematica, Web design tools (HTML language, Frontpage, Dreamweaver, Flash), Origin, Kaleidagraph, Peakfit, graphic design programs (Fireworks, Paint shop Pro)

## Research Projects

Effect of Bi concentration on electronic transport properties in dilute bismide modulation doped quantum well systems (*Researcher*), TUBITAK, Project Grant: 170k€, /2016

High Efficiency Solar cell based on GaInP/GaAs/n-i-p-i GaInNAs for 21st century (*Researcher*), TUBITAK, Project Grant: 120 k€, 2016

GaInNAs-based Resoant Cavity Enhanced Photodetector with internal gain for 1.3um (Director), TUBITAK, Project Grant: 120 k€, 2014

Investşgation of electonic transport emchanisms and optical properties of n- and p-type modulation doped GaInNAs/GaAs quantum well structures (Director), TUBITAK, Project Grant: 80 k€, 2011-2013

Investigation of electronic transport properties in quantum well infrared photodetectors (QWIP), (*Researcher*), TUBITAK, Project Grant: 120 k€, 2009-2012

Advanced Lithographic Methods Laboratory, (*Researcher*), State Ministry of Turkish Republic, Project Grant: 1.4 M€, 2009-2012

COST MP0805, Novel Gain Materials and Devices nased on III-V-N semiconductors, (*Researcher*), European Union, 2014

Technologies based on dilute nitrides, (*Director*), Istanbul University, Project Grant: 20 k€, 2014

Investigation of optical properties of III-N-V group multiple quantum well semiconductor structures, (*Director*), Istanbul University, Project Grant: 25 k€, 2009

N-containing Semiconductor laser design for optical communication, (*Researcher*), State Ministry of Turkish Republic, Project Grant: 110 k€, 2007

## Publications

### SCI Papers

Balkan N., Erol A., Sarcan F., Al-Ghuraibawi L., Nordin M., "Dilute nitride resonant cavity enhanced photodetector with internal gain for the ? ~ 1.3 µm optical communications window", SUPERLATTICES AND MICROSTRUCTURES, vol.86, pp.467-471, 2015

Sarcan F., Nutku F., Dönmez Ö., Kuruoğlu F., Mutlu S., Erol A., et al., "Quantum Oscillations And Interference Effects In Strained N- And P-Type Modulation Doped GaInNAs/GaAs Quantum Wells ", JOURNAL OF PHYSICS D-APPLIED PHYSICS, vol.48, pp.305108-305116, 2015

Nutku F., Dönmez Ö., Sarcan F., Erol A., Puustinen J., Arikan C.M., et al., "Negative and positive magnetoresistance in GaInNAs/GaAs modulation-doped quantum well structures", Applied Physics A, vol.118, pp.823-829, 2015

Dönmez Ö., Erol A., Arikan M.C., Makhloufi H., Arnoult A., Fontaine C., "Optical Properties Of GaAsBi Single Quantum Well Structures Grown By MBE", SEMICONDUCTOR SCIENCE AND TECHNOLOGY, vol.30, pp. 094016- 094016, 2015

Dönmez Ö., Sarcan F. , Lisesivdin S.B., Vaughan M., Erol A., Güneş M., et al., "Analytic modeling of temperature dependence of 2D carrier mobility in asgrown and annealed GaInNAs/GaAs quantum well structures", SEMICONDUCTOR SCIENCE AND TECHNOLOGY, vol.29, pp.125009-125012, 2014

Sarcan F., Dönmez Ö., Kara K., Erol A., Akalin E., Arikan M.Ç., Makhloufi H., Arnoult A., Fontaine C., "Bismuth-Induced Effects On Optical, Lattice Vibrational, And Structural Properties Of Bulk GaAsBi Alloys", NANOSCALE RESEARCH LETTERS, vol.9, pp.119-126, 2014

Broderick C.A., Mazzucato S., Carrere H., Amand T., Makhloufi H., Arnoult A., Fontaine C., Dönmez Ö., Erol A., Usman M., O'Reilly E.P., Marie X., "Anisotropic Electron G Factor As A Probe Of The Electronic Structure Of GaInNAs/GaAs Epilayers", PHYSICAL REVIEW B, vol.90, pp.195301-1-195301-11, 2014

Nutku F., Erol A., Arikan M.Ç., Ergün Y., "Zero-Bias Offsets In I–V Characteristics of The Staircase Type Quantum Well Infrared Photodetectors", APPLIED SURFACE SCIENCE, vol.1, pp.1-6, 2014

Dönmez Ö., Sarcan F. , Lisesivdin S.B., Vaughan M., Erol A., Güneş M., Arikan M.Ç., Puustinen J., Guina M., "Analytic Modeling Of Temperature Dependence Of 2d Carrier Mobility In As-grown And Annealed GaInNAs/GaAs Quantum Well Structures", SEMICONDUCTOR SCIENCE AND TECHNOLOGY, vol.29, pp.125009-125012, 2014

Royall B., Khalil H., Mazzucato S., Erol A., Balkan N., "Experimental investigation and numerical modelling of photocurrent oscillations in lattice matched Ga<sub>1-x</sub>In<sub>x</sub>NyAs<sub>1-y</sub> /GaAs quantum well p-i-n photodiodes", Nanoscale Res. Lett., 9, 84, 2014

Dönmez Ö., Sarcan F., Erol A., Güneş M., Arikan M.Ç., Puustinen J., Guina M., "Magnetotransport study on as-grown and annealed n- and p-type modulation-doped GaInNAs/GaAs strained quantum well structures", ", Nanoscale Res. Lett., 9, 141, 2014

Nutku F., Erol A., Arikan M.Ç., Ergün Y., "Zero-bias offsets in I-V characteristics of the staircase type quantum well infrared photodetectors", Appl. Surface Sci., 2014, DOI: <http://dx.doi.org/10.1016/j.apsusc.2014.01.054>

Sarcan F., Dönmez Ö., Kara K., Erol A., Akalin E., Arikan M.Ç., Makhloufi H., Arnoult A., Fontaine C., "Bismuth-induced effects on optical, lattice vibrational, and structural properties of bulk GaAsBi alloys", *Nanoscale Res. Lett.*, 9, 119, 2014

Sarcan F., Dönmez Ö., Erol A., Güneş M., Arikan M. Ç., Puustinen J., Guina M., "Influence Of Nitrogen On Hole Effective Mass and Hole Mobility in p-Type Modulation Doped GaInNAs/GaAs Quantum Well Structures", *Appl. Phys. Lett.*, 103, 082121, 2013

Ungan F., Yesilgul U., Sakiroglu S., Erol A., Kasapoglu E., Sarı H., Sökmen İ., "Effects Of Indium And Nitrogen Mole Concentrations On The Optical Properties In A GaInNAs/GaAs Quantum Well Under The Intense Laser Field", *Journal of luminescence*, 134, 208, 2013

Sarcan F. , Dönmez Ö., Güneş M., Erol A., Arikan M. Ç., Puustinen J., Guina M., "An Analysis Of Hall Mobility In As-Grown And Annealed n- and p-Type Modulation-Doped GaInNas/GaAs Quantum Wells", *Nanoscale Res. Lett.*, 7, 529, 2012

Dönmez Ö., Nutku F., Erol A., Arikan M. Ç., Ergün Y., "A Study of Photomodulated Reflectance on Staircase-Like, n-Doped GaAs/AlxGa1-xAs Quantum Well Structures", *Nanoscale Res. Lett.*, 7, 622, 2012.

Erol A., Akalin E., Sarcan F. , Dönmez Ö., Akyüz S., Arikan, M.Ç., Puustinen J., Guina M., "Excitation Energy-Dependent Nature of Raman Scattering Spectrum in GaInNAs/GaAs Quantum Well Structures", *Nanoscale Res. Lett.*, 7, 656, 2012.

Balkan N., Tıraş E., Erol A., Güneş M., Ardalı Ş., Arikan M. Ç., Lagarde D., Carrere H., Marie X., Gümüş C., "Acceptor Formation in Mg-Doped, Indium-Rich GaxIn1-xN: Evidence for p-type Conductivity", *Nanoscale Res. Lett.*, 7, 574, 2012.

Aşar N., Erol A., Okur S., Arikan M. Ç., "Morphology-Dependent Humidity Adsorption Kinetics of ZnO Nanostructures", *Sens. Actuat. A*, 187, 37, 2012

Dönmez Ö., Güneş M., Erol A., Arikan M. Ç., Balkan N., Schaff W., "The Role of Dislocation-Induced Scattering in Electronic Transport in GaxIn1-xN Alloys", *The role of dislocation-induced scattering in electronic transport in GaxIn1-xN alloys*, *Nanoscale Res. Lett.*, 7, 490, 2012

Nutku F., Erol A., Güneş M., Büklü L., Arikan M. Ç., Ergün Y., "I–V Characterization Of A Quantum Well Infrared Photodetector With Stepped And Graded Barriers", *Superlatt. Microstruc.*, 52, 585, 2012

Ungan F., Yeşilgül Ü., Sakiroglu S., Kasapoglu E., Erol A., Arikan M. Ç, Sarı H., Sökmen İ., "Effects Of An Intense, High-Frequency Laser Field On Bound States In Ga1-Xinxnyas1-Y/Gaas Double Quantum Well", *Nanoscale Res. Lett.*, 7, 606, 2012

Okur S., Üzar N., Tekgüzel N., Erol A., Arikan M. Ç., "Synthesis and humidity sensing analysis of ZnS nanowires", *Phys. E*, 44, 1103, 2012

Erol A., Yağmurcukardeş N., Okur S., Arikan M. Ç., "Humidity-Sensing Properties of a ZnO Nanowire Film as Measured with a QCM", *Sens. Actuat. B*, 152, 115, 2011

- Dönmez Ö., Erol A., Güneş M., Arikan M. Ç., Balkan N., "High Carrier Concentration Induced Effects on The Bowing Parameter and the Temperature Dependence of the Band Gap of  $GaxIn_{1-x}N$ ", J. Appl. Phys, 110, 103506, 2011
- Dönmez Ö., Yılmaz M., Erol A., Uluğ B., Uluğ A., Arikan M. Ç., Iliopoulos E., "Influence of High Electron Concentration on Band Gap and Effective Electron Mass of  $InN$ ", Phys. Stat. Solidi (b), 248, 1172, 2011
- Erol A., Okur S., Comba B., Mermer Ö., Arikan M. Ç., "Humidity Sensing Properties of  $ZnO$  Nanoparticles Synthesized by Sol–Gel Process", Sens. Actuat. B, 145, 174, 2010
- Sun Y., Balkan N., Erol A., Arikan M. Ç., "Electronic Transport in n- and p-Type Modulation-Doped  $GaNAs/GaAs$  Quantum Wells", Microelectron. J., 40, 403, 2009
- Sun Y., Erol A., Balkan N., Arikan M. Ç., Uluğ B., Uluğ A., Fontaine C., Arnoult A., Sopanen M., "Optical and Electrical Properties of Modulation Doped n and p Type  $GaNAs/GaAs$  Quantum Wells For 1.3 Micron Laser Applications", Opt. Quant. Electronics, 40, 467, 2007
- Erol A., Akçay N., Arikan M. Ç., Mazzucato S., Balkan N., "Spectral Photoconductivity and In-Plane Photovoltage Studies of As-Grown and Annealed  $GaNAs/GaAs$  and  $GaNAs/GaAs$  Quantum Well Structures", Semicond. Sci. Tech., 19, 1086, 2004
- Mazzucato S., Erol A., Boland Thoms A., Balkan N., "Transient Photoconductivity And In-Plane Photovoltage Studies In  $GaNAs/GaAs$  Quantum Wells", Physica Scripta, T114, 236, 2004
- Balkan N., Mazzucato S., Erol A., Hepburn C. J., Potter R. J., Boland-Thoms A., Vickers A., Chalker P. R., Joyce T.B., Bullough T. J., "Effect of fast thermal annealing on the optical spectroscopy in MBE- and CBE-grown  $GaNAs/GaAs$  QWs: blue shift versus red shift", IEE: Optoelectronics, 151, pp. 284-289, 2004
- Mazzucato S., Erol A., Potter R. J., Balkan N., Chalker P. R., Thomas S., Joyce T. B., Bullough T. J., "Optical Properties of  $GaNAs/GaAs$  Quantum Wells", Solid State Electronics, 47, pp. 483-487, 2003
- Potter R.J., Alexandropoulos D., Erol A., Mazzucato S., Balkan N., Adams M.J., Marie X., Carrère H., Bedel E., Lacoste G., Arnoult A., Fontaine C., "Comparison of theoretical models for interband transitions in dilute nitrides and experimental measurement", Physica E, 17, pp. 240-241, 2003
- Mazzucato S., Potter R.J., Erol A., Balkan N., Chalker P.R., Joyce T.B., Bullough T.J., Marie X., Carrère H., Bedel E., Lacoste G., Arnoult A., Fontaine C., "S-shaped behaviour of the temperature-dependent energy band gap in dilute nitrides", Physica E, 17, pp. 242-244, 2003
- Mazzucato S., Balkan N., Teke A., Erol A., Potter R., Arikan M. Ç., Marie X., Fontaine C., Carrere H., Bedel E., Lacoste G., "In-Plane Photovoltage and Photoluminescence Studies in Sequentially Grown  $GaNAs$  And  $GaNAs$  Quantum Wells", J. Appl. Phys., 93, 2440, 2003

Akçay N., Erol A., Arikan M. Ç., Mazzucato S., Chalker P., Joyce T., "In-Plane Photovoltaic and Photoconductive Effects an GaInAs and GaInNAs Double Quantum Well Structures", IEE Optoelectron., 150, 96, 2003

Mazzucato S., Erol A., Teke A., Arikan M.Ç., Potter R., Balkan N., Marie X., Boland Thoms A., Carrere H., Bedel E., Arnoult A., Fontaine C., Lacoste G., "Photo-Induced Transient Spectroscopy And In-Plane Photovoltage In GaInNas/GaAs Quantum Wells", Phys. E, 17, 250, 2003

Erol A., Mazzucato S., Arikan M.Ç., Carrère H., Arnoult A., Bedel E., Balkan N., "Photo-Induced Transient Spectroscopy of Defect Levels in GaInNAs", Semicond. Sci. Technol., 18, 968, 2003

Erol A., Balkan N., Arikan M. Ç., Serpengüzel A., Roberts J., "Temperature Dependence of the Threshold Electric Field in a Hot Electron VCSEL", IEE Optoelectron., 150, 535, 2003

### **Non SCI Papers**

Başak H., Erol A., Arikan M., Saarinen M., "The Effects Of Quantum Well Numbers And Thermal Annealing On Optical Properties Of GaInNAs/GaAs Quantum Well Structures", physica status solidi (c), 8, 1641, 2011

Nutku F., Arikan M., Erol A., Ergün Y., Kendirlik M., "I-V Characterization Of A Staircase Quantum Well Infrared Photodetector", Phys. Stat. Sol. c, 8, 1633, 2011

Erol A., Arikan M., "Effects Of Growth Conditions On Morphologies Of The ZnO Nanostructures", Physica status solidi (c), 4, 244-247, 2007

Serpengüzel A., Balkan N., Erol A., Arikan M., Roberts J., "Temperature Dependence Of The Threshold Electric Field in a Hot Electron VCSEL", SPIE Proceeding, 5725, 2005

### **Book Chapters**

Erol A., Arikan M.Ç., "Photoconductivity And Transient Spectroscopy", in: Semiconductor Research Experimental techniques, Amalia Patane, Naci Balkan, Eds., Springer-Verlag , USA, pp.333-366, 2012

### **Books**

Erol A., Balkan N., "Yarıiletkenler ve Optoelektronik Uygulamaları (Semiconductors and Optoelectronic Applications)", Seçkin Yayıncılık, ANKARA, 2013

Erol A., Ed., "Dilute III-V Nitride Semiconductors And Material Systems: Physics And Technology", Springer, New York, 2008

Balkan N., Erol A., "Çevremizdeki Fizik (Physics Around Us)", TÜBİTAK, ANKARA, 2005