

# Curriculum Vitæ de Kenan Elibol, M.Sc.

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**Keywords:** Physics, Solid State, Semiconductor Physics, PZT, STO, LAO, YSZ, Graphene, III-V, GaAs, GaN, PZT-CMOS, AlGaIn/GaN HEMT, QW, Electron Transport, Magnetotransport, Hall Effect, Lithography, Device Simulation, AFM, SEM, MBE, CVD, PLD

## EDUCATIONAL BACKGROUND

- Apr. 2013-Present **Ph.D.:** University of Twente, Enschede, The Netherlands  
Faculty of Science & Technology  
MESA+ Institute for Nanotechnology
- Sep. 2010-Dec. 2012 **M.Sc.:** Gazi University, Ankara, Turkey  
Institute of Natural and Applied Sciences  
Photonics Research Center
- Sep. 2006-July 2010 **B.Sc.:** Gazi University, Ankara, Turkey  
Department of Physics

## Language Proficiency

Turkish  
English

## RESEARCH EXPERIENCES

### **Ph.D. Fulltime Researcher, 2013-Present**

I have been working on the integration of ferroelectrics on CMOS (PZT-CMOS) since April 2013, working under the supervision of Prof. Dr. ing. A.J.H.M. Rijnders and Dr. G. Koster at MESA+ Institute for Nanotechnology's Inorganic Materials Science Group, University of Twente.

### **M.Sc. Student Researcher, 2010-2012**

I have worked as a fulltime student researcher in the investigation of magnetoconductivity and surface properties of exfoliated and epitaxially grown graphene samples since 2010, working under the supervision of Assoc. Prof. Dr. Sefer Bora Lişivdin at Nanoscale Devices and Carrier Transport (NDCT) Group of the Gazi Photonics Research Center. My M.Sc. thesis was part of a project which is a collaboration of the work carried out by Bilkent University Nanotechnology Research Center (NANOTAM) and Gazi Photonics Research Center. My thesis work consists of the investigation of magnetoconductivity and surface properties of exfoliated and epitaxially grown graphene samples. While the properties of the magnetoconductivity of graphene samples were investigated using Hall effect system, the properties of the surface of graphene samples were investigated using optical microscope, AFM, and SEM. Furthermore, the graphene Hall bar devices were fabricated using Optical and E-beam lithography methods which are also used in Hall effect, and I-V measurements. In addition to all, I have worked on transport properties of GaN-based HEMT structures, except my thesis work.

**B.Sc. Undergraduate Researcher, 2008-2010**

I worked as an undergraduate researcher in the investigation of quantum, strain, and transport parameters of two-dimensional electron gas (2DEG) in AlGa<sub>N</sub>/Ga<sub>N</sub> and InAlN/GaN HEMT structures in between 2008-2010 working under the supervision of Assoc. Prof. Dr. Sefer Bora Lişesivdin at Semiconductor Technologies Advanced Research Laboratory (STARLAB), situated in Gazi University, Department of Physics, Ankara, TURKEY. Furthermore, I finished my seasonal advanced physics project which is about electrical characterization of GaN-based metal semiconductor field effect transistors (MESFETs) in between 2009-2010.

**EMPLOYMENT**

2013-Present

Inorganic Materials Science Group of the MESA+ Institute for Nanotechnology, University of Twente  
Fulltime Researcher,

I have been working on the integration of ferroelectric dielectric materials on CMOS under the supervision of Prof. Dr. ing. A.J.H.M. Rijnders and Dr. G. Koster.

2010-2013

Nanoscale Devices and Carrier Transport (NDCT) Group, Gazi Photonics Research Center  
Student Researcher,

Worked on magnetoconductivity and surface properties of exfoliated and epitaxially grown graphene samples and transport properties of GaN-based HEMT structures under the supervision of Assoc. Prof. Dr. Sefer Bora Lişesivdin.

2010-2011

Nanotechnology Research Center (NANOTAM), Bilkent University  
Student Researcher,

I performed part of my MSc thesis work at Bilkent University Nanotechnology Research Center (NANOTAM) under the supervision of Prof. Dr. Ekmel Özbay and Assoc. Prof. Dr. Sefer Bora Lişesivdin.

2008-2010

Semiconductor Technologies Advanced Research Laboratory (STARLAB), Gazi University  
Undergraduate Researcher,

Worked on transport properties of GaN-based HEMT structures with Assoc. Prof. Dr. Sefer Bora Lişesivdin

**AWARDS**

- 2011 Best Poster Award, XVII. Solid State Matter Physics Ankara Meeting at Middle East Technical University.
- 2010-2012 Present Project Scholarship, TUBITAK (The Scientific and Technological Research Council of Turkey).
- 2010 Best Project Award, 1st place in a project competition for senior physics students organized by Bilkent University.

**LEADERSHIP**

- 2008-2012 A group of students known as the Kuark Molecular NanoScience Research Group, Project Manager.
- 2008-2009 Journal of Physics Students, Layout Editor.
- 2008 Gazi University Physics Days, Organizing Committee.
- 2006-2012 NetBilim Popular Science Magazine, The editorial board.

## RESEARCH INTERESTS

- Ferroelectric and Piezoelectric Materials.
- Novel ferroelectric based-devices.
- PZT-CMOS devices.
- Growth and characterization of Graphene single, bilayer and trilayers,
- Device fabrication at the micro and nanoscale,
- Graphene and GaN-based sensors for biological and chemical applications,
- Weak localization and antilocalization in graphene,
- Transport properties of low-dimensional systems,
- Photo-induced Hall Effect, photoconductivity, Shubnikov de Hass parameters, surface and magnetoconductivity properties, and quantum parameters of graphene,
- Electron and magnetotransport properties of III-V group semiconductor materials and graphene,
- Transport, strain, persistent photoconductivity, quantum parameters of 2DEG of AlGaIn/GaN, AlGaIn/(AlN)/GaN, AlGaIn/(AlN)/GaN/AlN and AlInN/AlN/GaN/AlN HEMT structures,
- 2D and bulk scattering mechanisms involved in III-V materials, graphene/SiC, and graphene/SiO<sub>2</sub>,
- The self-consistent theory of graphene transport,
- Simulation of nanostructures (graphene, molecular electronics) on the atomic scale,
- Self-consistent Schrodinger-Poisson device simulations of III-V group semiconductors,
- As tools; Hall Effect (HE), AFM, SEM, PLD, Optical and E-beam Lithography, semiconductor device simulators NextNano3 and TiberCAD, and atomic-scale simulation software for nanoscience Atomistix ToolKit (ATK).

## PUBLICATIONS & PROCEEDINGS

**Total SCI-indexed cites: 3 (as of Apr 11<sup>th</sup>, 2013)**

### Articles

#### 2013

- K. Elibol, G. Atmaca, P. Tasli, and S. B. Lisesivdin, "A Numerical Study on Subband Structure of In<sub>x</sub>Al<sub>1-x</sub>N/GaN-Based HEMT Structures with Low-Indium ( $x < 0.10$ ) Barrier Layer" *Solid State Communications* **162**, 8–12, (2013).

#### 2012

- K. Elibol, B. Sarikavak-Lisesivdin, C. Gunes, A. F. Kuloglu, E. Boyali, and S. B. Lisesivdin, "Numerical and Analytical Investigation of the Effects of InAlN/AlGaIn Barrier in GaN-Based HEMTs" (Submitted, *Int. J. Electronics* **2012**).
- G. Atmaca, K. Elibol, B. Sarikavak-Lisesivdin, S. B. Lisesivdin, E. Ozbay, "Numerical Investigation

of Two Dimensional Electron Gas in  $\text{In}_y\text{Al}_{1-y}\text{N}/\text{In}_x\text{Al}_{1-x}\text{N}/\text{AlN}/\text{GaN}$  Double Barrier HEMTs” (Submitted, *Solid State Sci.* 2012).

## 2010

- P. Tasli, B. Sarikavak, G. Atmaca, K. Elibol, A. F. Kuloglu and S. B. Lisesivdin, “Numerical Simulation of Novel Ultrathin Barrier n-GaN/InAlN/AlN/GaN HEMT Structures: Effect of In Mole Fraction, Doping and Layer Thicknesses” *Physica B* 405, 4020 (2010).

## 2009

- G. Atmaca, K. Elibol, S. B. Lisesivdin, M. Kasap, E. Ozbay, “Numerical optimization of Al-mole fractions and layer thicknesses in normally-on AlGaIn-GaN double-channel high electron mobility transistors (DCHEMTs)” *J. Optoelectron. Adv. Mater.* 11, 578 (2009).

## Proceedings

### 2011

- K. Elibol, G. Atmaca, S. Bütün, S.B. Lişesivdin and E. Özbay “Epitaksiyel grafende Hall ve zayıf antilokalizasyon ölçümleri” *XVIII. Solid State Matter Physics Ankara Meeting*, p67 (2011).
- K. Elibol, G. Atmaca, E. Özbay and S.B. Lişesivdin “Tek ve çift tabakalı grafen alan etkili transistörlerin (GFET) akım-gerilim (I/V) performansı” *XVIII. Solid State Matter Physics Ankara Meeting*, p66 (2011).
- G. Atmaca, K. Elibol, G. Karakoç, C. Güneş and S.B. Lişesivdin “Tek kanal ve çift kanal InGaIn/InN çoklu yapıların kıyaslanması” *XVIII. Solid State Matter Physics Ankara Meeting*, p64 (2011).
- K. Elibol, G. Atmaca, O. Kelekci, P. Tasli, E. Ozbay, S.B. Lisesivdin “Self-consistent Transport Properties of Graphene Sheets” *Turkish Physical Society XXVIII. International Conference*, p710 (2011).
- K. Elibol, C. Gunes, A. F. Kuloglu, E. Boyali, S.B. Lisesivdin “A Numerical Study on Effects of InAlN/AlGaIn Barrier in InAlN/AlGaIn/AlN/GaN based High Electron Mobility Transistors” *Turkish Physical Society XXVIII. International Conference*, p711 (2011).
- G. Atmaca, K. Elibol, P. Tasli, S.B. Lisesivdin “Effects On Two Dimensional Electron Gas Of InGaIn Back-Barrier For Ultrathin Barrier AlN/GaN High Electron Mobility Transistors” *VII. Nanoscience and Nanotechnology Conference*, p3 E. 11 (2011).

### 2010

- K. Elibol, Ö. Kelekçi, G. Atmaca, S. B. Lişesivdin, M. Kasap, S. Özçelik and E. Özbay “Development of Graphene Flake Production Methods” *XVII. Solid State Matter Physics Ankara Meeting*, S2 (2010).
- K. Elibol, G. Atmaca, P. Tasli, S.B. Lisesivdin, M. Kasap “Optimization and Device Characteristics of The AlGaIn/GaN Based HEMTs with InGaIn Back Barriers” *Turkish Physical Society XXVII. International Conference*, p621 (2010).
- G. Atmaca, K. Elibol, P. Tasli, S.B. Lisesivdin and M. Kasap “Numerical Investigation of Two Dimensional Electron Gas  $\text{In}_y\text{Al}_{1-y}\text{N}/\text{In}_x\text{Al}_{1-x}\text{N}/\text{AlN}/\text{GaN}$  Double Barrier HEMTs” *Turkish Physical Society XXVII. International Conference*, p591 (2010).
- K. Elibol, G. Atmaca, P. Taşlı, S. B. Lişesivdin and M. Kasap “GaIn Tabanlı MESFET Yapıların 2-boyutta Elektriksel Karakteristikleri” *XVII. Solid State Matter Physics Ankara Meeting*, P34 (2010).

- G. Atmaca, K. Elibol, P. Taşlı, S. B. Lişesivdin and M. Kasap “Eklem Alan Etkili Transistörlerin Elektriksel Karakteristiklerinin İncelenmesi” *XVII. Solid State Matter Physics Ankara Meeting*, S12 (2010).
- O. Kartaloğlu, G. Atmaca, K. Elibol and S. B. Lişesivdin “Erbiyum Katkılı Eklem Diyotun I-V Karakteristiği” *XVII. Solid State Matter Physics Ankara Meeting*, P46 (2010).

## 2009

- G. Atmaca, K. Elibol, P. Tasli, S. B. Lisesivdin, M. Kasap “Çift kanallı AlGaAs/InGaAs/GaAs tabanlı p-HEMT Yapılarında 1 ve 2-boyutta Schrödinger-Poisson Çözümleri ve Akim-Gerilim İncelemeleri” *XVI. Solid State Matter Physics Ankara Meeting*, P59 (2009).
- P. Tasli, S. B. Lisesivdin, M. Kasap, K. Elibol, G. Atmaca, E. Ozbay “A Numerical Study on Subband Structure of  $Al_xIn_{1-x}N/GaN$ -based HEMT Structures with Low-Indium ( $x>0.82$ ) Barrier Layer” *Turkish Physical Society XXVI. International Conference*, p509 (2009).

## 2008

- K. Elibol, G. Atmaca, S. B. Lişesivdin, M. Kasap, S. Özçelik “Optimization of Al-mole Fraction and Layer Thicknesses in  $Al_xGa_{1-x}N/AlN/GaN/Al_xGa_{1-x}N/AlN/GaN$  Double Channel HEMT Structures” *Turkish Physical Society XXV. International Conference*, p454 (2008).

## Seminars

- “Low-dimensional systems, carbon nanostructures, and biological sensors” Turkey Bioengineering Summit and IX. Bioengineering Days, Department of Bioengineering, Ege University İzmir, Turkey, Apr 21<sup>th</sup>, 2012.
- “Optimization of a GaN-based Double-Channel High Electron Mobility Transistors (DC-HEMTs)” Semiconductor Technologies Advanced Research Laboratory, Department of Physics, Gazi University, Ankara, Turkey, Feb 25<sup>th</sup>, 2009.

## Others

- K. Elibol “Investigation of Magnetoconductivity and Surface Properties of Exfoliated and Epitaxially Grown Graphene Samples” Gazi University, Institute of Natural and Applied Sciences – **M.Sc. Thesis** – (2012).
- K. Elibol “Electrical Characterization of GaN-Based Metal Semiconductor Field Effect Transistors (MESFETs)” Gazi University, Department of Physics – **B.Sc. Thesis** – (2010).

## CONFERENCES – COURSES – WORKSHOPS

### Conferences

- June 25-29<sup>th</sup> 2012, VIII. Nanoscience and Nanotechnology Conference, Hacettepe University, Ankara, Turkey
- April 2<sup>nd</sup> 2011, 4. Nanotechnology Day, Bilkent University, Ankara, Turkey
- November 5<sup>th</sup> 2010, XVII. Solid State Matter Physics Ankara Meeting, Ankara University, Ankara, Turkey

- September 14-17th 2010, Turkish Physical Society XXVII. International Conference, Istanbul, Turkey
- March 27th 2010, 3. Nanotechnology Day, Bilkent University, Ankara, Turkey
- November 6th 2009, XVI. Solid State Matter Physics Ankara Meeting, Gazi University, Ankara, Turkey
- October 17th 2008, X. National Optic, Electro-optic and Photonic Workshop, Kocaeli, Turkey
- August 25th-30th 2008, Turkish Physical Society XXV. International Conference, Bodrum, Turkey
- May 2-9th 2008, Gazi University Physics Days, Ankara, Turkey
- April 19th 2008, 2. Nanotechnology Day, Bilkent University, Ankara, Turkey
- April 2007, Istanbul Technical University Robot Olympiads, ITU, Istanbul, Turkey

### **Courses - Educational Workshops**

- Erbudak, M. “Workshop on Physics and Chemistry of Solids: Theory and Experiment: Inner-shell spectroscopies (1 Day)” Bilkent University, Ankara, Turkey, November 12th 2011.
- Toffoli, D. “Workshop on Physics and Chemistry of Solids: Theory and Experiment: Computational multi-mode dynamics (1 Day)” Bilkent University, Ankara, Turkey, November 11th 2011.
- Pescia, D. “Workshop on Physics and Chemistry of Solids: Theory and Experiment: Magnetism in matter (1 Day)” Bilkent University, Ankara, Turkey, November 10th 2011.
- Gürlü, O. “Workshop on Physics and Chemistry of Solids: Theory and Experiment: Scanning tunneling microscopy (STM) and spectroscopy (STS): theory, instrumentation and applications (1 Day)” Bilkent University, Ankara, Turkey, November 9th 2011.
- Erbudak, M. “Workshop on Physics and Chemistry of Solids: Theory and Experiment: Atomic structure of surfaces (1 Day)” Bilkent University, Ankara, Turkey, November 8th 2011.
- Ide, S. “Workshop on Physics and Chemistry of Solids: Theory and Experiment: X-ray crystallography (1 Day)” Bilkent University, Ankara, Turkey, November 7th 2011.
- Toffoli, H. “Workshop on Physics and Chemistry of Solids: Theory and Experiment: Fundamentals of Solid State Physics (1 Day)” Bilkent University, Ankara, Turkey, November 6th 2011.
- Yeh, N.-C. “Eurasia Pacific Summer School and Conference on Strongly Correlated Electrons: Conventional superconductivity, High-Tc cuprate superconductivity, High-Tc ferrous superconductivity, Electronic properties of gaphene (1 Week)” Institute of Theoretical and Applied Physics, Marmaris, Turkey, July 4th-9th 2011
- Shankar, R. “Eurasia Pacific Summer School and Conference on Strongly Correlated Electrons: Single-layer FQHE, Chern-Simons theory & non-abelian anyons (1 Week)” Institute of Theoretical and Applied Physics, Marmaris, Turkey, July 4th-9th 2011
- Refael, G. “Eurasia Pacific Summer School and Conference on Strongly Correlated Electrons: Topological phases and Majorana Fermions: old electrons learn new tricks (1 Week)” Institute of Theoretical and Applied Physics, Marmaris, Turkey, July 4th-9th 2011
- Maple, B. “Eurasia Pacific Summer School and Conference on Strongly Correlated Electrons: Kondo effect, valence fluctuations and heavy fermion behavior, Superconductivity, quantum

criticality, and non-Fermi liquid behavior (1 Week)” Institute of Theoretical and Applied Physics, Marmaris, Turkey, July 4th-9th 2011

- Bang, Y. “Eurasia Pacific Summer School and Conference on Strongly Correlated Electrons: Impurity effects in superconductors (1 Week)” Institute of Theoretical and Applied Physics, Marmaris, Turkey, July 4th-9th 2011
- Alloul, H. “Eurasia Pacific Summer School and Conference on Strongly Correlated Electrons: NMR studies of the static and dynamic magnetic properties and charge distributions in correlated electron systems: cuprates and cobaltates (1 Week)” Institute of Theoretical and Applied Physics, Marmaris, Turkey, July 4th-9th 2011

## ADDITIONAL INFORMATION

**URL:** <http://kenanelibol.wordpress.com>

**Sex:** Male

**Child:** No

**Work Experience:** Yes

**Health Problem:** No

**Social Activities/Hobbies/Fan:** Researching, The authorship of popular science magazine

**Birth Date:** March 05, 1988

**Nationality:** Republic of Turkey

**Marital Status:** Single

**Driving License:** B

**Military Service:** Postponed

**Smoke:** No

## INFORMATION TECHNOLOGY & OFFICE KNOWLEDGE

### Desktop Knowledge

Mathematica, MagicPlot, SigmaPlot, Origin, Flash, AutoCAD, Corel Paint Shop Pro, Adobe Acrobat, MS Office Applications, Openoffice, KLayout.

### Programming Languages

C++, Fortran, HTML.

### Operating / Network Systems

Windows NT/2000/XP/Vista/7 Series, Linux, DOS.