



HILMI ÜNLÜ

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International Researcher IDs

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Biography

Prof. Dr. Hilmi Ünlü received his PhD degree in Electrical Engineering from University of Minnesota at Twin Cities, USA in 1986. After working at Coordinated Science Laboratory of the University of Illinois at Urbana-Champaign, U.S.A. as Post Doctoral Research Associate (1986-1989) he joined the University of Miami, Florida, U.S.A. as Assistant Prof. of Electrical & Computer Engineering (1990-1992). He then started working at İstanbul Technical University as Assistant Professor of Physics Engineering, where he has been Full Professor since 2005.

Prof. Dr. Hilmi Ünlü is an expert on nanoscience and nanotechnology of semiconductor materials and devices. He has co-authored 5 international scientific and technical books, authored/co-authored 3 book chapters and edited/translated 4 internationally well recognized physics books from English to Turkish, which was awarded by the Turkish Academy of Science (TÜBA) as the best translated book in Natural Sciences. He has published 35 scientific papers in refereed international journals indexed by Science Citation Index (SCI), 20 scientific works in Conference Proceedings and 30 abstracts in Book of Abstracts in international scientific conferences.

Learning Knowledge

Doctorate 1982 - 1986	University of Minnesota-Twin Cities, Elektrik Mühendisliği, United States Of America
Postgraduate 1982 - 1984	University of Minnesota-Twin Cities, Elektrik Mühendisliği, United States Of America
Undergraduate 1974 - 1978	Istanbul University, Faculty Of Science, Department Of Physics, Turkey

Foreign Languages

English, C1 Advanced

Dissertations

Doctorate, Theory of Heterojunctions, University Of Minnesota-Twin Cities, Elektrik Mühendisliği, 1986

Postgraduate, PN Junction Modelling, University Of Minnesota-Twin Cities, Elektrik Mühendisliği, 1984

Academic Titles / Tasks

Professor 2005 - Continues	Istanbul Technical University, Fizik Mühendisliği Bölümü
Associate Professor 1997 - 2005	Istanbul Technical University, Fen-Edebiyat Fakültesi, Fizik Mühendisliği Bölümü
Assistant Professor 1995 - 1997	Istanbul Technical University, Fen-Edebiyat Fakültesi, Fizik Mühendisliği Bölümü
Assistant Professor 1990 - 1992	University of Miami, College Of Engineering, Electrical And Computer Engineering

Supported Projects

- Ünlü H., Turfanda A., Project Supported by Higher Education Institutions, Nanoscale Two Dimensional Materials for Computer Memories, 2022 - Continues
- Ünlü H., Project Supported by Higher Education Institutions, CdSe Kuantum Noktaların Optik ve Elektronik Özellikleri ve Uygulamaları, 2011 - Continues
- Ünlü H., Nabı A., Project Supported by Higher Education Institutions, SYNTHESIS AND CHARACTERIZATION OF CARBON QUANTUM DOTS BY MICROWAVE HEATING METHOD, 2021 - 2024
- Ünlü H., Project Supported by Higher Education Institutions, CdSe/ZnSe Tabanlı Nano-Heteroyapı Çekirdek/Kabuk Kuantum Noktalarının Sentezi, Karakterizasyonu ve Bilgisayar Tasarımı, 2015 - 2021
- Ünlü H., Project Supported by Higher Education Institutions, Çok tabakalı CdSe tabanlı Nano-Heteroyapı Kuantum Noktaların Sentezi, Karakterizasyonu ve Tasarımı, 2015 - 2021
- Ünlü H., Project Supported by Higher Education Institutions, Nanoyapı Yarıiletkenlerinin Elektronik Özelliklerinin Sıkı Bağlanım Kuramı ile Tasarımı ve Bilgisayar Benzetimi, 2011 - 2021
- Ünlü H., Project Supported by Higher Education Institutions, Tight Binding Modelling of SiC/III-Nitride Heterostructures, 2016 - 2018
- Ünlü H., Project Supported by Higher Education Institutions, BOND ORBITAL MODELLİNG OF SiGEC/Si HETEROSTRUCTURES, 2015 - 2018
- Ünlü H., Project Supported by Higher Education Institutions, Nanoboyutlu Yarıiletkenlerin Yoğunluk Fonksiyoneli Kuramı İle Tasarımı ve Bilgisayar Benzetimi, 2011 - 2013
- Ünlü H., TUBITAK Project, Design and analysis of Cd-based quatum dots, 2006 - 2009
- Ünlü H., Project Supported by Higher Education Institutions, Heteroyapı Bipolar Tranzistörlerin Modellenmesi, 1998 - 2006
- Ünlü H., Project Supported by Higher Education Institutions, Heteroyapı bipolar cihazda 1/F görüntüsünün tasarımı, 2004 - 2005

13. Ünlü H., Project Supported by Higher Education Institutions, Yarı İletken Heteroyapılarda Sıcaklığın ve Basıncın Yüklü Parçacıklara Etkisinin Bilgisayar Analizi, 1999 - 2001

Articles Published in Other Journals

1. **A Thermoelastic Model for Interface Strain Effects in Microscale and Nanoscale Heterostructures**
ÜNLÜ H.
JOURNAL OF MATERIALS AND ELECTRONIC DEVICES, vol.1, no.1, pp.24-33, 2019 (Peer-Reviewed Journal)
2. **Interface Strain Effects on ZnSe CdSe based Type I and ZnSe CdS Type II Core Shell Quantum Dots**
Gheshlaghi N., Pisheh H. S., ÜNLÜ H.
Energy Procedia, vol.102, pp.152-163, 2016 (Peer-Reviewed Journal)
3. **Modelling of Heterostructures for Low Dimensional Devices**
GÜREL H. H., Akinci O., Ünlü H.
LOW-DIMENSIONAL AND NANOSTRUCTURED MATERIALS AND DEVICES: PROPERTIES, SYNTHESIS, CHARACTERIZATION, MODELLING AND APPLICATIONS, pp.1-47, 2016 (Scopus)
4. **Colloidal Synthesis and Characterization of CdSe Quantum Dots Role of Cd Se Molar Ratio and Temperature**
Aydın H., Karim M. R., Balaban M., ÜNLÜ H.
International Journal of Scientific & Technology Research, vol.6, no.1, pp.66-70, 2016 (Scopus)
5. **Optical studies of semiconductor Quantum Dots**
Yükselici H., Allahverdi C., Aşıkoğlu A., Ünlü H., Baysal A., Çulha M., Ince R., Ince A., Feeney M., Athalin H.
NanoScience and Technology, vol.77, pp.101-117, 2013 (Scopus)

Books & Book Chapters

1. **Sears and zemansky s University Physics BÖLÜM 2**
ÜNLÜ H., GİZ A. T., POSTACIOĞLU M. N., YÜKSELİCİ M. H.
PEARSON, 2017
2. **Sears and Zemansky'xxs University Physics with Modern Physics Electricity and Magnetism (Volume 2)**
ÜNLÜ H., GİZ A. T., M Nazmi P., M Hikmet Y.
Pearson Education , New York, 2017
3. **Low Dimensional and Nanostructured Materials and Devices**
ÜNLÜ H., Horing N. J. M., Dabrowski J.
Springer, Heidelberg, 2016
4. **Sears and Zemansk's University Physics with Modern Physics**
ÜNLÜ H., Giz A. T., Postacioğlu M. N., Yükselici M. H.
Pearson Education , New York, 2016
5. **Modelling of Heterostructures for Low Dimensional Devices**
Gürel H. H., Akıncı Ö., ÜNLÜ H.
in: Low Dimensional and Nanostructured Materials and Devices, H. Ünlü, N. M.Horing and J. Dabrowski, Editor, Springer, Heidelberg, pp.1-47, 2016
6. **Modeling of Low-Dimensional Semiconductors**
ÜNLÜ H., Gürel H. H., Akıncı Ö., Karim M. R.
in: Low Dimensional Semiconductor Structures, Hilmi Ünlü and Norman J. M. Horing, Editor, Springer, Heidelberg, pp.19-38, 2013
7. **Advances in Low-Dimensional Semiconductor Structures .**
ÜNLÜ H., Karim M. R., Gürel H. H., Akıncı Ö.
in: Low Dimensional Semiconductor Structures, Hilmi ünlü and Norman J. M. Horing, Editor, Springer, Heidelberg,

pp.1-17, 2013

8. **Modelling of Heterostructure Bipolar Devices**
ÜNLÜ H., Akıncı Ö., Gürel H. H.
IUS, Saraybosna, 2010
9. **Symmetr Analysis in Differential Equations**
Can M., ÜNLÜ H.
IUS, Saraybosna, 2010
10. **Principles and Technology of MODFETs Vol 2**
Morkoç H., ÜNLÜ H., Ji G.
John Wiley and Sons, Chichester, 1991
11. **Principles and Technology of MODFETs Vols 1**
Morkoç H., ÜNLÜ H., Ji G.
John Wiley & Sons, Chichester, 1991
12. **Factors Affecting the Performance of (Al,Ga)As/GaAs and (In,Ga)As/(Al,Ga)As Modulation Doped FETs: Microwave and Digital Applications**
Morkoç H., ÜNLÜ H.
in: Semiconductors and Semimetals Vol 24 pp 135 201 volume edited by R Dingle R K Willardson and A Beer
Treatise editors, R. Dingle, Editor, Academic Press , York, pp.135-201, 1987

Refereed Congress / Symposium Publications in Proceedings

1. **Modeling of Interface Strain and Composition Effects in GaAs/Si Based Planar Heterostructures**
ÜNLÜ H.
5th International conference on materials science and nanotechnology for next generation (MSNG2018), 4 - 06 October 2018
2. **Strain Effects on Bandgap, Diameter and Dielectric Constant of Bare CdSeCore and CdSe/ZnS Core/Shell Quantum Dots at any Temperature**
ÜNLÜ H., Karim M. R.
5th International conference on materials science and nanotechnology for next generation (MSNG2018), Nevşehir, Turkey, 4 - 06 October 2018, pp.145
3. **A Thermoelastic Model for Interface Strain Effects in Microscale and Nanoscale Heterostructures**
ÜNLÜ H.
5th International Materials Science and Technology for Next Generation Conference, Nevşehir, Turkey, 4 - 06 October 2018
4. **Determining the Band Gap of CdSe Quantum Dots from HighFrequency Dielectric Constant Measurements**
karim m. r., ÜNLÜ H.
2nd International Conference on Physics forSustainable Development and Technology, ICPSDT-2017, Chittagong, Bangladesh, 10 - 12 December 2017
5. **Tight Binding Modelling of Binary/Ternary and Ternary/Binary Heterostructure Core/Shell Quantum Dots**
ÜNLÜ H.
Turkishsh Physical Society 33rd International Physics Congress (TPS33), Turkey, 6 - 10 September 2017
6. **Thermal Expansion and Lattice Mismatch Strain Effects on Core Bandgap and Diameter of CdSe/ZnS Heterostructure Core/Shell Quantum Dots**
Karim M. R., ÜNLÜ H.
Turkish Physical Society 33rd International Physics Congress (TPS33), Bodrum, Turkey, 6 - 10 September 2017
7. **Temperature and Strain Effects on Core Bandgap and Diameter of Bare CdSe Core and CdSe/ZnS Heterostructure Core/Shell Quantum Dots**
Karim M. R., Ünlü H.

33rd International Physics Congress of the Turkish-Physical-Society (TPS), Bodrum, Turkey, 6 - 10 September 2017, vol.1935

8. **Modelling of CdSe/CdZnS and ZnSe/CdZnS Binary/Ternary Heterostructure Core/Shell Quantum Dots**
Ünlü H.
33rd International Physics Congress of the Turkish-Physical-Society (TPS), Bodrum, Turkey, 6 - 10 September 2017, vol.1935
9. **Tight Binding Modeling of AlGa_N/Ga_N and InGa_N/Ga_N Spherical Core/Shell Quantum Dots**
ÜNLÜ H.
E-MRS ICNS 12 Meeting, Strasbourg, France, 24 - 27 July 2017
10. **Effects of Interface Strain and Growth Temperature on Optical and Dielectric Properties of CdSe and CdSe ZnS Nanocrystals**
Karim R. M., Pisheh H. S., Gheshlaghi N., ÜNLÜ H.
Science & Applications of Thin Films, Conference & Exhibition (SATF 2016), Çeşme, Turkey, 19 - 23 September 2016
11. **Synthesis Characterization and Modelling of ZnSe Zn Cd S Core Shell and ZnSe Zn Cd S Cd Zn S Core Shell Nanocrystals**
Gheshlaghi N., Pisheh H. S., ÜNLÜ H.
Science and Applications of Thin Films, Conference & Exhibition (SATF 2016), Çeşme, Turkey, 19 - 23 September 2016
12. **Tight Binding Modelling of Composition and Interface Strain Effects in Nanoscale Epitaxial and Colloidal Heterostructures**
ÜNLÜ H.
Science & Applications of Thin Films, Conference & Exhibition (SATF 2016), Çeşme, Turkey, 19 - 23 September 2016
13. **A comparative Tight Binding and DFT Study of Structural and Electronic Properties of Wurtzite and Zincblende Al_xIn_{1-x}N**
ÜNLÜ H., Meziani A., Semra L., Quahrani T., Gürel H. H., Telia A.
Science and Applications of Thin Films, Conference & Exhibition (SATF 2016), Çeşme, Turkey, 19 - 23 September 2016
14. **Synthesis Characterization and Modelling of CdSe Cd_xZn_{1-x}S Core Ternary Shell Nanocrystals**
Pisheh H. S., Gheshlaghi N., ÜNLÜ H.
Science and Applications of Thin Films, Conference & Exhibition (SATF 2016), Çeşme, Turkey, 19 - 23 September 2016
15. **Synthesis Characterization and Modelling of ZnSe Zn Cd S Cd Zn S and CdSe Zn Cd S Cd Zn S Core Shell Heterostructured Nanocrystals**
Sedaghat Pisheh H., Gheshlaghi N., ÜNLÜ H.
European Materials Research Society 2016 Fall Meeting, Varşova, Poland, 19 - 22 September 2016
16. **Characterization and Modelling of CdSe Cd_xZn_{1-x}S Core Ternary Shell Nanocrystals**
Sedaghat Pisheh H., Gheshlaghi N., ÜNLÜ H.
European Materials Research Society 2016 Fall Meeting, Varşova, Poland, 19 - 22 September 2016
17. **Synthesis Characterization and Modelling of ZnSe Zn Cd S Core Shell and ZnSe Zn Cd S Cd Zn S Core Shell Shell Nanocrystals**
Gheshlaghi N., Sedaghat Pisheh H., ÜNLÜ H.
European Materials Research Society 2016 Fall Meeting, Varşova, Poland, 19 - 22 September 2016
18. **Density Functional Theory Calculations of III-N Based Semiconductors with mBJLDA**
GÜREL H. H., Akinci O., Ünlü H.
32nd International Physics Congress of Turkish-Physical-Society (TPS), Bodrum, Turkey, 6 - 09 September 2016, vol.1815
19. **Interface Strain Effects on ZnSe/(CdSe) based Type I and ZnSe/CdS Type II Core/Shell Quantum Dots**

Gheshlaghi N., Pisheh H. S., Karim M. R., Ünlü H.

E-MRS Spring Meeting / Symposium T on Advanced Materials and Characterization Techniques for Solar Cells III, Lille, France, 2 - 06 May 2016, vol.102, pp.152-163

20. **Tight Binding Modelling of SiC III Nitride Heterostructures**

ÜNLÜ H.

European Materials Research Society Spring Meeting, 2 - 06 May 2016

21. **Effects of Strain and Temperature on Optical and Dielectric Properties of CdSe and CdSe ZnS Nanocrystals**

Karim M. R., S Pisheh H., ÜNLÜ H.

2nd International Nanoscience and Nanotechnology for Next Generation (NaNoNG) 2015 Conference, Antalya, Turkey, 29 - 31 October 2015

22. **Bond Orbital Modelling of SiGeC Si Heterostructures**

ÜNLÜ H.

European Materials Society 2015 Fall Meeting, Varşova, Poland, 14 - 16 September 2015

23. **Bond Orbital Modelling of Heterostructures**

Ünlü H.

9th International Physics Conference of the Balkan-Physical-Union (BPU), İstanbul, Turkey, 24 - 27 August 2015, vol.1722

24. **BOND ORBITAL MODELLING OF ELECTRONIC AND DIELECTRIC PROPERTIES OF HETEROSTRUCTURES**

ÜNLÜ H.

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

25. **Tight binding modeling of electronic properties of III-V based heterostructures**

Akinci O., GUREL H. H., Ünlü H.

3rd International Symposium on Growth of III-Nitrides (ISGN), Montpellier, France, 4 - 07 July 2010, vol.8

26. **Density Functional Theory of Structural and Electronic Properties of III-N Semiconductors**

Gurel H. H., Akinci O., Ünlü H.

Conference of the E-MRS Symposium F, Strasbourg, France, 8 - 10 June 2010, vol.1292, pp.177-178

27. **Tight binding modelling of electronic structure of GaPN/GaP, InAsN/InAs and GaAsN/GaAs heterostructures**

Akinci O., GUREL H. H., Ünlü H.

E-MRS 2007 Spring Meeting-Symposium F Novel Gain Materials and Devices Based on III-N-V Compounds, Strasbourg, France, 28 May - 01 June 2007, vol.5, pp.478-484

28. **Tight binding modelling of electronic band structure in conventional InGaN/GaN and dilute GaAsN/GaAs nitride heterostructures**

Gurel H. H., AKINCI O., Ünlü H.

International Conference on Superlattices, Nano-Structures and Nano-Devices, İstanbul, Turkey, 30 July - 04 August 2006, vol.4, pp.316-317

29. **Semiempirical tight binding modeling of electronic band structure of III-V nitride heterostructures**

Gurel H. H., Akinci O., Ünlü H.

28th International Conference on the Physics of Semiconductors (ICPS-28), Vienna, Austria, 24 - 28 July 2006, vol.893, pp.171-172

30. **Modelling of 1/F noise in heterostructure bipolar devices**

Unlu H.

Conference on Noise in Devices and Circuits, Maspalomas, Spain, 26 - 28 May 2004, vol.5470, pp.226-241

31. **Band Offsets and Carrier Transport in GaN Based HBTs**

ÜNLÜ H.

Int. Workshop on Nitride Semiconductors, Nagoya, Japan, 17 - 24 September 2000, vol.1, pp.977-980

32. **Modeling of current transport and 1/F noise in GaAs heterobipolar devices**

Unlu H.

2nd International Conference on Unsolved Problems of Noise and Fluctuations (UPoN 99), Adelaide, Australia, 12 - 15 July 1999, vol.511, pp.440-446

33. **Band offsets and current transport in GaN based HBTs**
Unlu H.
International Workshop on Nitride Semiconductors (IWN 2000), Nagoya, Japan, 24 - 27 September 2000, vol.1, pp.977-980
34. **A quantum thermomechanical modeling of band offsets and Schottky barriers of semiconductor heterostructures**
ÜNLÜ H.
1998 International Semiconductor Conference. CAS'98 Proceedings (Cat. No.98TH8351), Sinaia, Romania, 6 - 10 October 1998, vol.393
35. **Effects Of Strains On The Polar Non Polar Heteroepitaxy**
ÜNLÜ H., Morkoç H.
Growth of Compound Semiconductor Structures II, Newport Beach, CA, 14 - 20 March 1998
36. **A quantum thermochemical modeling of band offsets and Schottky barriers of semiconductor heterostructures**
Unlu H.
1998 International Semiconductor Conference (CAS 98), SINAIA, Romania, 6 - 10 October 1998, pp.393-405

Academic and Administrative Experience

2010 - 2012	Rector	Sarajevo Üniversitesi
2008 - 2009	Head of Department	İstanbul Teknik Üniversitesi, Fen-Edebiyat Fakültesi, Fizik Mühendisliği Bölümü
2005 - 2008	Vice Dean	İstanbul Teknik Üniversitesi, Fen-Edebiyat Fakültesi

Research Areas

Physics, Interdisciplinary Physics and Related Science and Technology Areas, Materials Science, Natural Sciences, Engineering and Technology

Non Academic Experience

International University of Sarajevo