Senol Mutlu, Ph.D.

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PERSONAL INFORMATION

Nationality: Turkish
Year of Birth: 1977
Marital Status: Married, with one child

EDUCATION

Doctor of Philosophy (Ph.D.), Electrical Engineering, Sep. 2000-Jan. 2005
University of Michigan, Ann Arbor, MI. Major in Circuits and Microsystems. Minor in Solid State.
Advisors: Carlos H. Mastrangelo and Yogesh B. Gianchandani.

Ph.D. Thesis: *Microfluidic Biochemical Analysis System with Electro-Osmotic Pump and Thermally Responsive Polymer Valve.*

Master of Science (M.S.), Electrical Engineering: Circuits and Microsystems, 2000-2002
University of Michigan, Ann Arbor, MI

Bachelor of Science (B.S.), Electrical Engineering (Computers), 1996-2000
University of Southern California (USC), Los Angeles, CA. **Overall GPA** 3.93/4.00

WORK EXPERIENCE

- **Visiting Scientist,** Sep. 2019-July 2020, Max Planck Institute for Intelligent Systems, Stuttgart, GERMANY.
- **Full Time Professor,** Jul. 2017-Now, Bogaziçi University, Department of Electrical and Electronics Engineering, İstanbul, TURKEY.
- **Associate Professor,** Feb. 2013-Jul. 2017, Bogaziçi University, Department of Electrical and Electronics Engineering, İstanbul, TURKEY.
- **Assistant Professor,** Sep. 2005-Feb. 2013, Bogaziçi University, Department of Electrical and Electronics Engineering, İstanbul, TURKEY.
- **Post-doctoral Research Fellow,** Jan. 2005 – June 2005, University of Michigan, Ann Arbor, *Michigan Nanofabrication Facility*, Electrical Engineering and Computer Science Department.

Advisor: Khalil Najafi.

- **Research Assistant**, Sep. 2000 – Jan. 2005, University of Michigan, Ann Arbor, *Engineering Research Center for Wireless Integrated MicroSystems (ERC WIMS)*, Electrical Engineering and Computer Science Department.

Project title: "*Large-Scale Integration of Solid-State Microfluidic Valves with No Moving Parts*" Sponsored by DARPA Bioflips program.

RESEARCH INTEREST and EXPERTISE

*·Micro Electro-Mechanical Systems (MEMS) ·

* Organic Electronics

* Polymer Thin Film Microfabrication

* Microfluidics and BioMEMS

* Solid State Devices & 2D Materials

* Energy Harvesting

* Electrochemical Etching and Deposition for Nano/Micro Patterning

FOUNDED and DIRECTED LABORATORIES

- Founder and Director of **Bogazici University Micro Electro Mechanical Systems (BUMEMS) Laboratory**, Sep 2005-Now, Bogaziçi University, Department of Electrical and Electronics Engineering, İstanbul, TURKEY.

The aim of this laboratory is to do research on Micro ElectroMechanical Systems (MEMS), circuits, MEMS-circuit integration and polymer microfabrication including organic / polymer electronics and microfluidics. The initial focus is mainly on polymer microfabrication and their applications to MEMS, integrated polymer microsystems and electronic circuitry since it involves relatively cheaper and easier fabrication methods and equipment. The efforts to build the BUMEMS laboratory at the Department of Electrical and Electronics Engineering started on September 2005. The laboratory is under constant development. In-house polymer MEMS fabrication capabilities are developed, which lead to the fabrication of polymer electronics, polymer light emitting diodes, microfluidic devices and various integrated polymer micro systems. Novel devices have been shown by integrating organic electronics to MEMS and microfluidics.

CONFERENCES ORGANIZED

- Technical Program Co-Chair, The fourth conference on Ph.D. Research in Microelectronics and Electronics (PRIME) 2008, Istanbul, Turkey, 22-25 June 2008.

ADMINISTRATIVE and ACADEMIC SERVICES

- Member of the Advisory Board of Technology and Innovation Grant Programs Directorate (TEYDEB) of The Scientific and Technological Research Council of Turkey (TUBITAK), Electrical-Electronic Technologies Group (ELOTEG), 2015 - 2016.

- Member of the Advisory Board of The Scientific and Technological Research Council of Turkey (TUBITAK), Electrical-Electronics and Information Research Group (EEEAG), 2012 - 2014.

- Member of the Advisory Board of the Bogazici University Advanced Technologies Research and Development Center, 2008 - Now.

- Advisor, Senior Design Projects, Department of Electrical and Electronics Engineering, Fall 2007-Now.

- Panelist for TUBITAK 1001 and Kariyer Project Panels, **EEEAG** Spring 2006, Summer 2007, Fall 2007, Summer 2007, Fall 2008, Spring 2009, Fall 2010, Fall 2011 **TBAG** Spring 2007, Summer 2007, Summer 2008, Fall 2009, **MAG** Fall 2012.

- Periodic Evaluator for TUBITAK 1001 and Kariyer Projects

- Panelist and Periodic Evaluator for TUBITAK TEYDEB Projects

TEACHING EXPERIENCE

- **Instructor**, EE 535: Introduction to Micro Electro Mechanical Systems, Bogaziçi University, İstanbul, Turkey, Fall 2005 – Now.
- **Instructor**, EE 307: Semiconductor Physics and Devices, Sabancı University, EE Department, İstanbul, Turkey, Fall 2015.
- **Instructor**, EE 540: Advanced Digital Systems, Bogaziçi University, İstanbul, Turkey, Spring 2006, Spring 2007, Spring 2008.
- **Instructor**, EE 443: Microprocessors, Bogaziçi University, İstanbul, Turkey, Fall 2008 – Now.
- **Instructor**, EE 201: Electrical Circuits I, Bogaziçi University, İstanbul, Turkey, Spring 2012.
- **Instructor**, EE 240: Digital Systems, Bogaziçi University, İstanbul, Turkey, Spring 2007-Now.
- **Teaching Assistant**, EECS 515: Integrated Microsystems, University of Michigan, Ann Arbor, MI, Fall 2004.
- **Teaching Assistant**, EECS 514: Advanced Micro Elecro Mechanical Systems (MEMS) devices and technologies, University of Michigan, Ann Arbor, MI, Winter 2004.
- **Teaching Assistant**, EECS 498/598: Micromanufacturing Processes, University of Michigan, Ann Arbor, MI, Winter 2004.

PROJECTS

- **Realization of Wireless and Batteryless System with Sensor by Developing Triboelectric Energy Harversters with Nano Surfaces and Matched RF Integrated Circuits**

Project Sponsor:	TÜBİTAK 1003 (2016-2020)
Project Team:	Şenol Mutlu
Responsibility	Principal Investigator
Project Code:	215E288
Budget:	~$500000

- **Realization of Electronic Circuits with Microfluidics and Its Sensors Applications**

Project Sponsor:	TÜBİTAK 1001 (2015-2018)
Project Team:	Şenol Mutlu
Responsibility	Principal Investigator
Project Code:	114R080
Budget:	~$300000

- **Organic Electronics Integrated with Micro and Nano Fluidic Channels**

Project Sponsor:	TÜBİTAK 1001 (2010-2013)
Project Team:	Şenol Mutlu, Amitav Sanyal
Responsibility	Principal Investigator
Project Code:	110E063
Budget:	~$300000

- **Integrated Polymer Micro Systems (INPOMIS)**
  Project Sponsor: TÜBİTAK 1001 (2006-2009)
  Project Team: Şenol Mutlu, Günhan Dündar
  Responsibility Principal Investigator
  Project Code: 106E013
  Budget: ~$300000

- **Novel Biopsy Needle and Assisted Robotic System Design for Prostate Biopsy Procedure under MRI**
  Project Sponsor: TÜBİTAK 1001 (2015-2018)
  Project Team: Özgür Kocatürk, Şenol Mutlu
  Responsibility Researcher
  Project Code: 115E271
  Budget: ~$150000

- **A 5 Fr "Active" Guiding Catheter Design for Percutaneous Congenital Heart Dieases Treatment in Pediatric Patients under MRI**
  Project Sponsor: TÜBİTAK 1001 (2013-2015)
  Project Team: Özgür Kocatürk, Şenol Mutlu
  Responsibility Researcher
  Project Code: 112R024
  Budget: ~$150000

- **A Novel Integrated Optoelectronic System For Automatic Catheter Localization in Interventional MRI**
  Project Sponsor: TÜBİTAK 1001 (2008-2011)
  Project Team: Arda Deniz Yalçınkaya, Cengizhan Öztürk, Şenol Mutlu
  Responsibility Researcher
  Project Code: 108E119
  Budget: ~$350000

- **Polymer MEMS and Polymer Light Source Based Monolithic Integrated Displays**
  Project Sponsor: TÜBİTAK 1001 (2007-2010)
  Project Team: Arda Deniz Yalçınkaya, Şenol Mutlu
  Responsibility Researcher
  Project Code: 107E053
  Budget: ~$250000

- **Center for the Development of Microsystem Based Medical Devices (Mikrosistem Bazlı Tıbbi Cihaz Geliştirme Merkezi)**
  Project Sponsor: Turkish Republic State Planning Organization Devlet Planlama Teşkilatı (2008-2011)
  Project Team: Cengizhan Öztürk, Şenol Mutlu, Arda Deniz Yalçınkaya, Günhan Dündar, Kıvanç Mıhçak, Burak Acar, Amitav Sanyal, Rana Sanyal, Ata Akın, Murat Gülsoy
  Responsibility Co-Principal Investigator
  Budget: ~$ 3 million

The purpose of this project is to found a center laboratory for the development of high-tech medical devices with smart integrated microsystems that can be inserted or implanted to human body.

- **Realization of Wireless and Batteryless Operating and Communicating Sensors**
  Project Sponsor: *European Cooperation in Science and Technology*: COST-Bogazici
  University Research Fund (2013-2016)
  Project Team: Şenol Mutlu
  Responsibility Principal Investigator
  Project Code: 7640
  Budget: ~$45000

- **Implementation of Optically Powered and Optically Communicating Wireless and Batteryless Microsystem**
  Project Sponsor: Bogazici University Research Fund (2012-2013)
  Project Team: Şenol Mutlu
  Responsibility Principal Investigator
  Project Code: 6520
  Budget: ~$15000

- **LED Based Wireless Microsystem Design and Fabrication**
  Project Sponsor: Bogazici University Research Fund (2011-2012)
  Project Team: Şenol Mutlu
  Responsibility Principal Investigator
  Project Code: 6037
  Budget: ~$15000

- **Development of Water Gated Transistors Using Ultra Thin Single Crystalline Silicon Films**
  Project Sponsor: Bogazici University Research Fund (2011-2012)
  Project Team: Şenol Mutlu
  Responsibility Principal Investigator
  Project Code: 6987
  Budget: ~$15000

- **Self-Terminating Electrochemical Etching of Stainless Steel for the Fabrication of Micro-Mirrors**
  Project Sponsor: Bogazici University Research Fund (2010-2011)
  Project Team: Şenol Mutlu
  Responsibility Principal Investigator
  Project Code: 5021
  Budget: ~$15000

- **Realization of MicroHeater Array for Thermal Patterning**
  Project Sponsor: Bogazici University Research Fund (2009-2010)
  Project Team: Şenol Mutlu
  Responsibility Principal Investigator
  Project Code: 09A201P
  Budget: ~$15000

- **Performance Enhancement of Polymer Photovoltaic Cells Using Post Fabrication Thermal and Electric Field Treatment under Vacuum**

Project Sponsor: Bogazici University Research Fund (2008-2009)
Project Team: Şenol Mutlu
Responsibility Principal Investigator
Project Code: 08A201
Budget: ~$15000

- **Fabrication and performance evaluation of flexible photocells and light emitting diodes for lighting purposes using semiconducting polymers**
  Project Sponsor: Istanbul Metropolitan Municipality (2007-2008)
  Project Team: Şenol Mutlu
  Responsibility Principal Investigator
  Budget: ~$9000

- **Tactile Sensors and Imagers Capable of Reading Fingerprints Using Polymer Microfabrication**
  Project Sponsor: Bogazici University Research Fund (2006-2008)
  Project Team: Şenol Mutlu
  Responsibility Principal Investigator
  Project Code: 06A201
  Budget: ~$15000

PUBLICATIONS

Total Citation: 1050 H-Index: 16 (Based on Google Scholar, Sep. 2021)
Total Citation: 697 H-Index: 13 (Based on ISI Web of Science, Sep. 2021)

Journal Papers:

1. Senol Mutlu, Oncay Yasa, Onder Erin, Metin Sitti, "Magnetic Resonance Imaging-Compatible Optically Powered Miniature Wireless Modular Lorentz Force Actuators", *Advanced Science*, p.2002948, 2020.
2. Ismail Kara, Mustafa Becermis, M.A.A. Kamar, M. Aktan, Hakan Dogan, Senol Mutlu, "A 70-to-2 V Triboelectric Energy Harvesting System Utilizing Parallel-SSHI Rectifier and DC-DC Converters", *IEEE Transactions on Circuits and Systems I: Regular Papers*, pp. 1-14, 2020.
3. E. Gencturk, K.O. Ulgen and S. Mutlu, "Thermoplastic microfluidic bioreactors with integrated electrodes to study tumor treating fields on yeast cells", *Biomicrofluidics*, 14(3), p.034104, 2020.
4. S. Mutlu, K. Unlu, T.N. Gevrek, A. Sanyal, "Expanding the versatility of poly (dimethylsiloxane) through polymeric modification: An effective approach for improving triboelectric energy harvesting performance", *Smart Materials and Structures*, vol. 29, issue 3, pp. 035024, 2020.
5. E. Gencturk, E. Yurdakul, A.Y. Celik, Senol Mutlu, K.O. Ulgen, "Cell trapping microfluidic chip made of Cyclo olefin polymer enabling two concurrent cell biology experiments with long term durability", *Biomedical Microdevices*, 22, 20, 2020.
6. S. Ozturk, I. Devecioğlu, M. Beygi, A. Atasoy, S. Mutlu, M. Ozkan, and B. Guclu, "Real-Time Performance of a Tactile Neuroprosthesis on Awake Behaving Rats", *IEEE*

Transactions on Neural Systems and Rehabilitation Engineering, 27(5), pp.1053-1062, 2019.

7. B.G. Sonmez, O. Ertop, Senol Mutlu, "Realization and AC modeling of electronic circuits with water-gated field effect transistors (WG-FET) based on gate probe distance", *Journal of Micromechanics and Microengineering*, 28(11), p.115017, 2018.
8. F. Dinc, O. Ertop, B.G. Sonmez, P. Zhao, A.N. Raegen, J.A. Forrest, Senol Mutlu, "Increased Yield of MoS2 Monolayer Exfoliation Through the Bimetallic Corrosion of Aluminum", *Applied Physics Letters*, Vol. 113, Issue 21, 2018.
9. I.E. Odabasi, Elif Gencturk, Sevde Puza, Senol Mutlu, Kutlu Ulgen, "A low cost PS based microfluidic platform to investigate cell cycle towards developing a therapeutic strategy for cancer," *Biomedical Microdevices*, Vol. 20, Issue 3, 57, 13 pages, 2018.
10. B.G. Sonmez, O. Ertop, Senol Mutlu, "Modelling and Realization of a Water-Gated Field Effect Transistor (WG-FET) Using 16-nm-Thick Mono-Si Film", *Scientific Reports*, vol. 7, Issue 1, pages 12190, 2017.
11. Iskender Haydaroglu, M. Ozgun, Senol Mutlu, "Optically Powered Optical Wireless Transmitter Using a Single Light Emitting Diode", *IEEE Transactions on Circuits and Systems I*, vol. 64, Issue 8, pages 2003-2012, 2017.
12. Sevde Puza, Elif Gencturk, Irem Ezgi Odabasi, Emre Iseri, Senol Mutlu, Kutlu Ulgen, "Fabrication of cyclo olefin polymer microfluidic devices for trapping and culturing of yeast cells," *Biomedical Microdevices*, Vol. 19, Issue 2, 40, 12 pages, 2017.
13. Nuno Carvalho, et al., Senol Mutlu, et al., "Europe and the Future for WPT : European Contributions to Wireless Power Transfer Technology," *IEEE Microwave Magazine*, Vol. 18, Issue 4, pp. 56-87, 2017.
14. E. Gencturk, Senol Mutlu, K.O. Ulgen, "Advances in microfluidic devices made from thermoplastics used in cell biology and analyses", *Biomicrofluidics*, vol. 11, Issue 5, 051502, 2017.
15. Mohammad Beygi, Senol Mutlu, Burak Guclu "Microfabricated strain gauge array on polymer substrate for tactile neuroprostheses in rats," *Journal of Micromechanics and Microengineering*, v. 26, Issue 8, 084006, 2016.
16. Engin Baysoy, Dursun Korel Yildirim, Cagla Ozsoy, Senol Mutlu, Ozgur Kocaturk, "Thin Film Based Active Resonant Marker Design for Low Profile Interventional Cardiovascular MRI Devices", *Magnetic Resonance Materials in Physics, Biology and Medicine (MAGMA)*, 2016, doi:10.1007/s10334-016-0586-8
17. I. Haydaroglu, Senol Mutlu, "Optical Power Delivery and Data Transmission in a Wireless and Batteryless Microsystem Using a Single Light Emitting Diode", *IEEE/ASME Journal of Microelectromechanical Systems*, Vol. 24, Issue 1, pp. 155-165, 2015.
18. Berkan Yaman, Ismail Terkesli, K.M. Turksoy, A. Sanyal, Senol Mutlu, "Fabrication of a Planar Water Gated Organic Field Effect Transistor Using Hydrophilic Polythiophene for Improved Digital Inverter Performance", *Organic Electronics*, Volume 15, Issue 3, pp. 646-653, 2014.
19. M. Tumer, B. Sarioglu, S. Mutlu, Y. Ulgen, A. Yalcinkaya, C. Ozturk, "Using a Low-amplitude RF Pulse at Echo Time (LARFET) for Device Localization in MRI", *Medical & Biological Engineering & Computing*, vol. 52, issue. 10, pp. 885-894, 2014.

20. Senol Mutlu, Bedri Gurkan Sonmez, "A Solution State Diode Using Semiconductor Polymer Nanorods with Nanogap Electrodes", *Nanotechnology*, 23 (2012) 245203.
21. B. Sarıoglu, O. Aktan, A. Oncu, Senol Mutlu, G. Dundar, A.D. Yalcinkaya, "An Optically Powered CMOS Receiver System for Intravascular Magnetic Resonance Applications", *IEEE Journal on Emerging and Selected Topics in Circuits and Systems*, Volume 2, Issue 4, pp. 683-691, 2012.
22. Tugce Nihal Gevrek, Rana Nur Ozdeslik, Gulcan Semra Sahin, Gulen Yesilbag, Senol Mutlu, Amitav Sanyal, "Functionalization of Reactive Polymeric Coatings via Diels–Alder Reaction Using Microcontact Printing", *Macromolecular Chemistry and Physics*, 213, pp. 166-172, 2012.
23. O. Aktan, B. Sarıoglu, U. Cindemir, S.O. Unlu, G. Dundar, Senol Mutlu, A.D. Yalcinkaya, "Optoelectronic CMOS Power Supply Unit for Electrically Isolated Micro-Scale Applications", *IEEE Journal of Selected Topics in Quantum Electronics*, Volume 17, Issue 3, pp. 747-756, 2011.
24. Senol Mutlu, Iskender Haydaroglu, A.O. Sevim, "Realization of Polymer Charge Pump Circuits Using Polymer Semiconductors", *Organic Electronics*, v.12, issue 2, pp. 312-321, 2011.
25. Senol Mutlu, A. O. Sevim, "Active Microheater Matrix Using Polymer Semiconductor Diodes for Thermal Patterning," *Journal of Micromechanics and Microengineering*, vol. 20, n. 3**,** 035019 (8pp), 2010.
26. Y.D. Gokdel, Senol Mutlu, A.D. Yalcinkaya, "Self-Terminating Electrochemical Etching of Stainless Steel for the Fabrication of Micro-Mirrors," *Journal of Micromechanics and Microengineering*, Vol. 20, 095009 (6pp), 2010.
27. Y.D. Gokdel, A.O. Sevim, S. Mutlu, A.D. Yalcinkaya, "Polymer-MEMS-Based Optoelectronic Display", *IEEE Transactions on Electron Devices*, Volume 57, Issue 1, pp. 145-152, 2010.
28. Ali Osman Sevim, Senol Mutlu, "Post Fabrication Electric Field and Thermal Treatment of Polymer Light Emitting Diodes and Their Photovoltaic Responses," *Organic Electronics*, Volume 10, Issue 1, pp. 18-26, 2009.
29. Y.D. Gokdel, B. Sarioglu, Senol. Mutlu, A.D. Yalcinkaya, "Design and Fabrication of Two-Axis Micromachined Steel Scanners," *Journal of Micromechanics and Microengineering*, Vol. 19, 075001 (8pp), 2009.
30. Quanzhou Luo, Senol Mutlu, Yogesh B. Gianchandani, Frantisek Svec, and Jean M.J. Frechet, "Monolithic Valves For Microfluidic Chips Based On Thermoresponsive Polymer Gels, " *Electrophoresis*, vol.24, pp. 3694-3702, 2003.
31. Cong Yu, Senol Mutlu, P. Selvaganapathy, Carlos H. Mastrangelo, Frantisek Svec, and Jean M.J. Frechet, "Flow Control Valves For Analytical Microfluidic ChipsWithout Mechanical Parts Based On Thermally Responsive Monolithic Polymers, " *Analytical Chemistry*, vol.75 No. 8, pp.1958-1961, 2003.
32. Brian D. Jensen, Senol Mutlu, Sam Miller, Katsuo Kurabayashi, James J. Allen, "Shaped Comb Fingers For Tailored Electromechanical Restoring Force, " *IEEE/ASME Journal of Microelectromechanical Systems*, vol.12 No. 3, pp.373-383, 2003.

ISSCC Presentation:

I. Haydaroglu (Ph.D. Advisor Senol Mutlu), Presentation at the 2016 International Solid State Circuits Conferene (ISSCC) Student Research Preview session (Student work in progress), Jan. 31-Feb. 4, San Francisco, CA.

Book Chapter:

Senol Mutlu, "Challenges in neural interface electronics: miniaturization and wireless operation," in Somatosensory Feedback for Neuroprosthetics: Elsevier, 2021, pp. 537-559.

Conference Papers:

1. Ozan Ertop, Bahadir Donmez and Senol Mutlu, “Improved Gain and Bandwidth of Water-Gated Field Effect Transistor (WG-FET) Circuits Using Solutions with Higher Ion Concentration,” Proc. Transducers 2019 Conference, Berlin, Germany, June 23-27, pp. 1377-1380.
2. A.Y. Celik, K. Kaya and Senol Mutlu, “Paper Based Integrated Microfluidic System Using Electro-Osmotic Pumps with Liquid Bridges”, IEEE MEMS 2018 Conference, Belfast, UK, Jan. 21-25.
3. O. Ertop, B.G. Sonmez, Senol Mutlu, “Displacement Sensor with Inherent Read-Out Circuit Using Water Gated Field Effect Transistor (WG-FET),” 32nd. Eurosensors Conference, Graz, Austria, September 9-12, 2018.
4. K. Kaya, A.Y. Celik, Senol Mutlu, “Integration of Paper Based Electro-Osmotic Pumps to Continuous Microfluidic Channels,” 32nd. Eurosensors Conference, Graz, Austria, September 9-12, 2018.
5. E. Iseri and Senol Mutlu, “Realization of Triboelectric Energy Harvesters Using Steel-Polymer Microfabrication Methods”, IEEE MEMS 2017 Conference, Las Vegas, USA, Jan. 22-26.
6. O. Ertop, B.G. Sonmez, Senol Mutlu, “Investigation of the Salt Concentration Dependence of Water-Gated Field Effect Transistors (WG-FET) Using 16-nm-Thick Single Crystalline Si Film,” 31th. Eurosensors Conference, Paris, France, September 3-6, 2017.
7. O. Ertop, B.G. Sonmez, Senol Mutlu, “Improved repeatability in planar water-gated field effect transistor (WG-FET) with 16-nm-thick single crystalline Si film,” 30th. Eurosensors Conference, Budapest, Hungary, September 4-7, 2016 (Oral Presentation).
8. E. Iseri, K.O. Ulgen, C. Yılmaz, Senol Mutlu, “Fabrication of Steel Displacement Amplifiers Integrated to Microfluidic Channels”, IEEE MEMS 2016 Conference, Shanghai, China, Jan. 24-28.
9. Engin Baysoy, Dursun K Yildirim, Cagla Ozsoy, Adrienne C Washburn, Anthony Z Faranesh, Senol Mutlu, Robert J Lederman and Ozgur Kocaturk, “Lithography based resonant marker design for MRI catheter visualization”, 19th Annual Society for Cardiovascular Magnetic Resonance (SCMR) Scientific Sessions, Los Angeles, USA, Jan. 27-30, 2016.
10. Korel Dursun Yildirim, Engin Baysoy, Zahid Sagiroglu, Çagla Özsoy, Ozgur Kocatürk, and Senol Mutlu, “A Novel method for developing clinical grade active devices dedicated to interventional MRI procedures”, The International Society for Magnetic Resonance in Medicine (ISMRM) 24th Annual Meeting & Exhibition, 07-13 May 2016, Singapore.

11. Mohammed Beygi, Senol Mutlu, Burak Guclu, “Design and Microfabrication of a Strain-Gauge Array on Polymer Substrate for Tactile Neuroprostheses in Rats”, 26th. Micro Mechanics Europe Workshop, MME 2015, Toledo, Spain, September 2015.
12. O. Ertop, B.G. Sonmez, Senol Mutlu, “Realization of a planar water-gated field effect transistor (WG-FET) using 16-nm-thick single crystalline Si film,” 28th. Eurosensors Conference, Brescia, Italy, September 2014 (Oral Presentation).
13. E. Iseri, E. Gencturk, M. Gurgen, A.K. Uguz, K.O. Ulgen and Senol Mutlu, “Macro to Microfluidic Channel Integration Using 3D Printing for Laminar Flow Investigation in a Y-Channel,” 25th. Micro Mechanics Europe Workshop, MME 2014, Istanbul, Turkey, September 2014.
14. K.M. Turksoy, B. Yaman, I. Terkesli, S. Mutlu, A. Sanyal, “Effect of semiconductor hydrophilicity in electrolyte gated organic field effect transistors”, European Polymer Congress 2013, Pisa, Italy, 16-21 June, Poster7-88.
15. B.G. Sonmez, S. Mutlu, “Microfluidic Channel Integrated Solution State Diode Using Semiconductor Polymer Nanorods with Nanogap Electrodes”, IEEE Nano, 12th International Conference on Nanotechnology, 20-23 August 2012, Birmingham, UK, pp. 284-287.
16. B. Sarioglu , O. Aktan, U. Cindemir, G. Dundar, C. Ozturk, S. Mutlu, A. D. Yalcinkaya, "Optoelectronic CMOS Power Supply Unit for Interventional MRI Devices ", *Proceedings of ISMRM*, 7-13 May 2011, Montreal, Canada.
17. I. Haydaroglu, S. Mutlu, “Energy Harvesting and Data Transmitting Microsystem Using a Light Emitting Diode”, *International Conference on Optical MEMS & Nanophotonics*, August 8-11, *2011*, Istanbul, Turkey.
18. B. Sarioglu, O. Aktan, U. Cindemir, S. Mutlu, G. Dundar, A.D. Yalcinkaya, “An RF Front-End with Optically Powered CMOS Power Supply”, *International Conference on Optical MEMS & Nanophotonics*, August 8-11, *2011*, Istanbul, Turkey.
19. B.K. Usta, Y.D. Gokdel, S. Mutlu, A.D. Yalcinkaya, “Selectively Thinned Stainless Steel Scanners through Electrical Discharge Machining”, *International Conference on Optical MEMS & Nanophotonics*, August 8-11, *2011*, Istanbul, Turkey.
20. Y.D. Gokdel, A.O. Sevim, B. Kucukakarsu, S. Mutlu, A.D. Yalcinkaya, “PLED integrated FR4 MEMS Display”, Proceedings of IEEE Photonics Society (LEOS), October 2009, Antalya, Turkey, pp. 71-72.
21. Orhan Mert, Senol Mutlu, “Self-Aligned Polymer Thin Film Transistors Fabricated Using Backside Exposure,” The 5th International Thin Film Transistor Conference, ITC 2009, Paris, France, March 2009, pp. 102-105.
22. Y.D. Gokdel, B.Sarioglu, Senol Mutlu, A.D. Yalcinkaya, “Two-Axis Micromachined Steel Scanners,” 19th. Micro Mechanics Europe Workshop, MME 2008, Aachen, Germany, September 2008. pp. 177-180.
23. Ali Osman Sevim, Şenol Mutlu, “MEH-PPV Based Polymer Passive Matrix Display Fabrication Using All Wet Etching and Lithographic Processes,” 19th. Micro Mechanics Europe Workshop, MME 2008, Aachen, Germany, September 2008, pp. 419-422.
24. Ali Osman Sevim, Şenol Mutlu, “Post Fabrication Electric Field Treatment of Polymer Light Emitting and Photovoltaic Devices,” Proceedings of 4th. Ph.D. Research in Microelectronics and Electronics (PRIME) 2008, Istanbul, Turkey, pp. 17-20.

25. M. Tabib-Azar, R. Wang, Senol Mutlu, Carlos Mastrangelo and Y. B. Gianchandani, "Microfabricated Gate-Modulated Electrochemical Ion Spectroscopy Sensor," Proc. Transducers 2007 Conference, Lyon, France, June 10-14, pp. 2307-2310.
26. Massood Tabib-Azar, Yan Xie, Senol Mutlu, Carlos Mastrangelo and Run Wang, "Ion Spectroscopy Using Microfluidic FlowFETs," ECS Trans., vol. 3, issue 10, 2006, pp. 35-42.
27. Senol Mutlu, A. Basu and Yogesh B. Gianchandani, "Maskless Electrochemical Patterning of Gold Films for BioSensors Using Micromachined Polyimide Probes," Presented in *IEEE Sensors 2005 Conference*, Irvine, California, USA, Oct. 31-Nov. 3.
28. Jong M. Park, Senol Mutlu, Yogesh B. Gianchandani, "Nano-Scale Abrasion Studies of Materials Used in MEMS Devices and Packages, " Accepted to *Proceedings of IMECE05, 2005 ASME International Mechanical Engineering Congress and Exposition*, November 5-11, Orlando, Florida, USA.
29. Senol Mutlu, Frantisek Svec, Carlos H. Mastrangelo, Jean M.J. Frechet, and Yogesh B. Gianchandani, "Enhanced Electro-Osmotic Pumping With Liquid Bridge and Field Effect Flow Rectification, " Presented in *IEEE MEMS 2004 Conference*, Maastricht, The Netherlands, Jan. 25-29, pp. 850-853.
30. Senol Mutlu, Cong Yu, Frantisek Svec, Carlos H. Mastrangelo, Jean M.J. Frechet, and Yogesh B. Gianchandani, "A Thermally Responsive Polymer Microvalve Without Mechanical Parts Photo-Patterned In A Parylene Channel, " *Proc. Transducers 2003 Conference*, Boston, Massachusetts, USA, June 8-12, pp. 802-805.
31. Senol Mutlu, P. Selvaganapathy, Cong Yu, Frantisek Svec, Carlos H. Mastrangelo, Jean M. J Frechet, " Micromachined Porous Polymer For Bubble Free Electro-Osmotic Pumping, " Presented in *Proc. IEEE MEMS 2002 Conference*, Las Vegas, USA, Jan. 20-24, pp. 19-22.
32. Brian D. Jensen, Senol Mutlu, Sam Miller, Katsuo Kurabayashi, James J. Allen, "Design and Simulation Of Shaped Comb Fingers For Compensation Of Mechanical Restoring Force In Tunable Resonators, " *Proceedings of 2001 ASME International Mechanical Engineering Congress and Exposition*, November 11-16, New York, NY, USA.

Supervised Ph.D. Thesis:

1. Ismail Kara, *A High Voltage Triboelectric Energy Harvesting System Utilizing Parallel-SSHI Rectifier and DC-DC Converters For Sub-5 Hz Motions*, 2020.
2. Bedri Gurkan Sonmez, *Realization and Modeling of Water-Gated Field Effect Transistors (WG-FET) Using 16-nm-Thick Single Crystalline Silicon Film and Their Circuit Applications*, 2017.
3. Iskender Haydaroglu, *Energy Harvesting Wireless Optical Microsystems*, 2016.

Ph.D. Thesis Being Supervised:

1. Ozan Ertop, on-going.
2. Zahid Sagiroglu, on-going.
3. Betül Küçükakarsu Usta, on-going.
4. Ismail Terkesli, on-going.

Supervised M.Sc. Thesis:

1. Mustafa Becermis, *DC-DC Buck Converter for Triboelectric Energy Harvesting Applications*, M.Sc. Thesis, Bogazici University, Istanbul, 2019.
2. Berk As, *Temperature Insensitive Ultra Low Power 0.7 V Supply Unit and Reference Driver for 8 Bit ADC in 65 nm CMOS Technology*, M.Sc. Thesis, Bogazici University, Istanbul, 2019.
3. Mustafa Asiroglu, *Sound Source Localization Using MEMS Digital Microphone Array*, M.Sc. Thesis, Bogazici University, Istanbul, 2019.
4. Ahmet Yasin Celik, *Paper Based Integrated Microfluidic System Using Electro-Osmotic Pumps with Liquid Bridges*, M.Sc. Thesis, Bogazici University, Istanbul, 2019.
5. Kemal Unlu, *Nano-Structured Triboelectric Nano Generators for Internet-of-Things (IoT) Applications*, M.Sc. Thesis, Bogazici University, Istanbul, 2018.
6. Doruk Dundar, *Water-Gated Field Effect Transistor with Integrated Microfluidic Channel*, M.Sc. Thesis, Bogazici University, Istanbul, 2017.
7. Mohammed Beygi, *Design and Microfabrication of a Strain-Gauge Array on Polymer Substrate for Tactile Neuroprosthesis in Rats*, M.Sc. Thesis, Bogazici University, Istanbul, 2016.
8. Emre Iseri, *Realization of microfluidic devices with steel displacement amplifiers for cell culturing and analysis*, M.Sc. Thesis, Bogazici University, Istanbul, 2015.
9. Zahid Sagiroglu, *Design and simulation of straight and tilted helical coils for magnetic resonance imaging*, M.Sc. Thesis, Bogazici University, Istanbul, 2015.
10. Ozan Ertop, *Fabrication and Characterization of a Planar Water Gated Field Effect Transistor Using 16 Nanometer Thick Single Crystalline Silicon Film*, M.Sc. Thesis, Bogazici University, Istanbul, 2014.
11. Burak Arıcıoglu, *Wireless and Batteryless Instant Velocity Sensor for Certain Daily Motions*, M.Sc. Thesis, Bogazici University, Istanbul, 2014.
12. Farshid Taleb Sis, *A Novel Biosensor Based on a Planar Water Gated Organic Field Effect Transistor Using Biotin Functionalized Polythiophene*, M.Sc. Thesis, Bogazici University, Istanbul, 2013.
13. Ibrahim Gokhan Haciahmetoglu, *Thermoelectrical Properties of Polythiophene (P3HT) Thin Film Polymers*, M.Sc. Thesis, Bogazici University, Istanbul, 2013.
14. Berkan Yaman, *Fabrication and Characterization of Liquid Electrolyte Gated Polymer Field Effect Transistor for Basic Circuit Applications*, M.Sc. Thesis, Bogazici University, Istanbul, 2013.
15. Ismail Terkesli, *Sensor Applications of Polymer Field Effect Transistors*, M.Sc. Thesis, Bogazici University, Istanbul, 2013.
16. Gurkan Bedri Sonmez, *Liquid State Diodes Using Semiconductor Polymers*, M.Sc. Thesis, Bogazici University, Istanbul, 2011.
17. Mehmet Usta, *VGA Projection Display Using Electromagnetically Actuated Steel Micromirrors*, M.Sc. Thesis, Bogazici University, Istanbul, 2011.
18. Orhan Mert, *Fabrication and Testing of Polymer Transistors for Basic Digital Circuits*, M.Sc. Thesis, Bogazici University, Istanbul, October, 2009.

19. Iskender Haydaroglu, *Realization of Charge Pump Circuits Using Polymer Semiconductors*, M.Sc. Thesis, Bogazici University, Istanbul, October, 2009.
20. Ali Osman Sevim, *Flexible Polymer Display Technologies*, M.Sc. Thesis, Bogazici University, Istanbul, March 2008.

Turkish Papers:

- E. Baysoy, D.K. Yıldırım, Ç. Özsoy, Z. Sagıroglu, Ö. Kocatürk, "Pediyatrik Hastalarda Konjenital Kalp Rahatsızlıklarının MRG Altında Tedavisinde Kullanılmak Üzere İnce Film Tabanlı ve 5 Fr Yarı Aktif Kateter Tasarımı", *Süleyman Demirel Üniversitesi Fen Bilimleri Enstitüsü Dergisi*, DOI-10, 2017.
- B. Gurkan Sonmez, Senol Mutlu, "Polimer Yarıiletken Kullanılarak Mikro Akışkan Kanal ile Tümleşik Çözelti Bazlı Işık Yayan Diyot Oluşturulması", 14. Ulusal Optik, Elektro-Optik ve Fotonik Calistayi, 14 Eylül 2012, Istanbul, sayfa 49-50.
- B. Gurkan Sonmez, Senol Mutlu, "Liquid Polymer Diodes with Nanoscale Electrode Separation", *7th Nanoscience and Nanotechnology Conference*, Haziran 2011, Istanbul.
- B. Gurkan Sonmez, Senol Mutlu, "Polimer Yari-iletken Kullanarak Sivi Isik Yayan Diyot (LED) Olusturulmasi", 12. Ulusal Optik, Elektro-Optik ve Fotonik Calistayi, 8 Ekim 2010, Istanbul, sayfa 55-56.
- B. Sarioglu, O. Aktan, U. Cindemir, G. Dundar, S. Mutlu, A.D. Yalcinkaya, "Kompakt CMOS Optoelektronik Guc Unitesi", 12. Ulusal Optik, Elektro-Optik ve Fotonik Calistayi, 8 Ekim 2010, Istanbul, sayfa 63-64.
- Orhan Mert, Senol Mutlu,"Organik Elektronik", *Endustri ve Otomasyon*, issue 145, Kasim 2008, pp 35-40.

Patent

- Senol Mutlu, P. Selvaganapathy, C. Yu, F. Svec, J. M. J. Frechet, C. H. Mastrangelo, "Porous Polymers: Composition And Uses Thereof," U.S. Patent Application No.: 20030232203.
- Senol Mutlu, "Finding exact value of circuit elements connected in passive matrix format (Pasif Matris Format Halinde Dizili Elektrik Elemanlarının Degerlerinin Tam Olarak Bulunmasını Saglayan Bir Sistem)," Turkish Patent Applied, 30059.14, 2016.
- Cengizhan Ozturk, Arda Deniz Yalcinkaya, Murat Tumer, Senol Mutlu, "MR setup for medical device tracking (Tıbbi cihaz takibi icin MR duzenegi)," Turkish Patent No.: 2011 123000.

HONORS AND AWARDS

- IEEE Senior Member
- Research Scholarship, Sep. 2019-July 2020, Max Planck Institute for Intelligent Systems, Stuttgart, Germany.
- 2015 The Science Academy Young Scientist Award (BAGEP), Turkey

- 2014 Middle Eastern Technical University Prof. Dr. Mustafa N. Parlar Research Encouragement Award
- Recipient of 2008, 2009, 2010, and 2011, 2012, 2013, 2014, 2015 Bogazici University Academic Encouragement Award
- Awarded 5 year guaranteed funding for Ph.D. study by the Electrical Engineering department of the University of Michigan (2000).
- Full scholarship recipient for B.Sc. Degree in the U.S. awarded by the Turkish Government (1996).
- Ranked 76th in the 1995 University Placement Test in Turkey out of about 1 million students (1995).
- Candidate for the Turkish Team in International Physics Olympiads (1995).
- Ranked 23rd in the High School Placement Test in Turkey out of about 1 million students (1992).

REVIEW SERVICES

- IEEE Journal of Microelectromechanical Systems (JMEMS)
- IEEE Journal of Solid State Circuits (JSSC)
- IEEE Transactions on Nanotechnology
- IEEE Transactions on Biomedical Circuits and Systems
- IEEE Sensors
- Journal of Micromechanics and Microengineering
- IOP Journal of Physics D
- Sensors And Materials
- Journal of Electrostatics

TECHNICAL SKILLS

- 20 year semiconductor processing experience including lithography, mask making, thin film deposition, reactive ion etch (RIE), chemical vapor deposition, high-aspect ratio silicon deep RIE, silicon-glass anodic bonding, anisotropic etching of silicon with KOH and device/material characterization using Dektak surface profilometer, Zygo surface interferometer and scanning electron microscopy (SEM).
- CMOS circuit design for energy harvesters.
- SOI wafer experience on the realization of a high performance transistor with 16 nm thick single crystalline silicon film.
- Fabrication and characterization of polymer light emitting diodes, diodes and transistors using semi-conducting (P3HT, MEH-PPV) and conducting (PEDOT:PSS) polymers.
- Experience in silicon-on-glass (SOG) process intended for integration of CMOS with capacitive sensors and actuators such as accelerometers, gyroscopes, resonators and

combdrives. Refined and characterized process steps, prepared documentation and layout design rules.

- Polymer processing and low temperature material processing. Experience in thin film processing and fabrication of parylene structures and devices as well as SU-8 and PDMS.
- Developed thin film formation and micromachining of a porous polymer.
- Microfabricated a new device, porous plug electro-osmotic pump, by integrating porous polymer into parylene fabrication process. This pump is compact, has no moving parts and large-scale integratable.
- Studied electrochemistry of a two-electrode-electrolyte system. Experience in electrochemical etching for nano/micro fabrication.
- Developed thin film formation and micromachining of a thermally responsive polymer.
- Microfabricated an inline valve with the thermally responsive polymer by integrating to parylene channels.
- Developed macro to micro fluidic interconnection setup and microfluidic device testing and control system.
- Experience in surface micromachined scanning thermal probe with parylene.

COURSEWORK OVERVIEW

CMOS fabrication technology, analog and digital circuit design, MEMS sensor and actuator design, micromachining technology, solid-state semiconductor fundamentals, microprocessors and controllers, Digital circuit design with ARM and FPGA.

Relevant Design Projects: Design and Simulation of Shaped Comb Fingers for Compensation of Mechanical Restoring Force, Surface Micromachined Capacitive Accelerometer With Closed-Loop Feedback, Fabrication, Testing and Characterization of MOSFETs in 1-μm technology, A 6-bit 800M Sample/s A/D Converter in 0.35-μm CMOS, 16 bit Microcontroller in 0.5-μm CMOS, A Monolithic Two-Stage Op-Amp.

COMPUTER SKILLS

Operating Systems: UNIX, DOS, Windows, Android.
Programming Languages: C/C++, Assembly, VHDL.
Special: Matlab, Femlab, CoventorWare, Cadence, HSpice, Mentor Graphics, Maxwell, Xilinx ISE, Altera Monitor Program, ARM assembly compiler.