

DR. GOZDE TUTUNCUOGLU

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| CONTACT INFORMATION | Assistant Professor Electrical and Computer Engineering Wayne State University Faculty Profile | 586-464-7330 gozde@wayne.edu Google Scholar Page (<i>h-index:29, citations:2108</i>) Research Group Page |
| DOMAIN INTERESTS | Novel Materials and Devices for Non von Neumann Computing Quantum and Neuromorphic Computing Data-driven Materials Discovery and Experimental Design | |
| PROFESSIONAL EXPERIENCE | Wayne State University , Detroit, MI <i>Assistant Professor of Electrical and Computer Engineering</i> April 2021 - Present <i>Director of ECE Online Masters Program: Semiconductor Engineering</i> September 2023 - Present Microsoft Quantum Lab , Delft, Netherlands <i>Researcher</i> October 2019 - February 2021 Project: <i>Robust and scalable technologies to develop topological qubits: Low-temperature epitaxial superconductor growth for in-situ fabricated quantum devices</i> Georgia Institute of Technology , Atlanta, GA <i>Postdoctoral Researcher</i> February 2017 - September 2019 Project: <i>Electronic Devices via Bottom-up Co-axial Nanolithography: Towards Large Scale Fabrication of Si Nanowire Transistors</i> with Prof. Michael A. Filler and Prof. Eric Vogel | |
| EDUCATION | Ecole Polytechnique Federale de Lausanne (EPFL) , Lausanne, Switzerland <i>Ph.D., Materials Science and Engineering</i> 2012-2016 Thesis Title: <i>Optoelectronic Properties of III-V Nanostructures Grown by Molecular Beam Epitaxy</i> Advisor: Prof. Anna Fontcuberta i Morral <i>M.S., Materials Science and Engineering</i> 2010-2012 Thesis Title: <i>Doping and Characterization of GaAs Nanowires with Sulphur Monolayer Doping</i> Advisor: Prof. Anna Fontcuberta i Morral Sabanci University , Istanbul, Turkey <i>B.S., Materials Science and Engineering</i> , Minor: Physics 2006-2010 Highest Honors | |
| RESEARCH SUPPORT | NSF - Division of Computing and Communication Foundations 04/15/2022 - 03/31/2024 CRII: 3D Printed Application-Specific Neuromorphic Circuits: Design, Fabrication, and Implementation Award Number: 2153177 Role: Single PI Budget: \$174,889 NSF - Division Of Electrical, Communication & Cyber Systems 09/01/2023 - 08/31/2028 RCN:SC: MSN Force: A Midwest Semiconductor Collaborative Network for Work Force Training Award Number: 2332207 Role: Lead PI Budget: \$766,136 | |

Michigan Economic Development Corporation

01/01/2024 - 01/01/2025

IndustryCraft: Industry-Aligned Certificate Programs in Semiconductor Engineering Cayuse Number: 23-1218

Role: **Lead PI**

Budget: \$303,870

Michigan Economic Development Corporation

01/01/2024 - 01/01/2025

IndustryCraft: An Experiential Learning Program for Future Semiconductor Engineers Cayuse Number: 23-1225

Role: **Lead PI**

Budget: \$275,852

Oak Ridge National Lab User Proposal

08/01/2022 - 07/31/2024

Enhancing Memristor Device Performance through Comprehensive Defect-Engineering

Award Number: CNMS2022-B-01539

Role: **Single PI**

Budget: Covers yearly equipment and operating costs (Estimated to be \$30-40K in standard cleanroom fees)

Oak Ridge National Lab User Proposal

08/01/2023 - 07/31/2025

Nanoscale 3D Printing for Neuromorphic Circuitry

Award Number: CNMS2023-B-02040

Role: **Single PI**

Budget: Covers yearly equipment and operating costs (Estimated to be \$30-40K in standard cleanroom fees)

TEACHING
SUPPORT

Wayne State College of Engineering 2022 Technology Advisory Committee Proposal

2022-2023

COMSOL Multiphysics – A comprehensive, interdisciplinary finite element simulation tool for engineering design at the Wayne State College of Engineering

Budget: \$14,528

SELECTED
PUBLICATIONS

Authored and coauthored **55 journal publications, h-index:29, citations:2108** on semiconductor nanostructure growth and device fabrication for nanoelectronics applications.

A selected list of the five journal articles is provided here:

- [1] The Impact of Operation Conditions on Potentiation, Depression and Endurance Dynamics of Tantalum Oxide RRAMs: Moazzeni, A, Chowdhury, and Tutuncuoglu, G. **2023 IEEE International Integrated Reliability Workshop (IIRW)** Just accepted. IEEE.
- [2] Role of Defects in Resistive Switching Dynamics of Memristors: Tutuncuoglu, G.; Mannodi-Kanakkithodi, A. **MRS Communications**, 12, pp. 531–542 (2022)
- [3] Reducing Conductivity Variability in Si Nanowires via Surface Passivation for Nanoelectronics: W.Yuan, G. Tutuncuoglu et al. **ACS Applied Nano Materials**, vol. 4, pp. 3852-3860, (2021)
- [4] Bottom-Up Masking of Si/Ge Surfaces and Nanowire Heterostructures via Surface Initiated Polymerization and Selective Etching: Mohabir, A.; Tutuncuoglu, G. et al.; **ACS Nano**, 14, 282-288, (2020)
- [5] Template Assisted Scalable Nanowire Networks: Friedl, M. ; Cerveny, K.; Weigele, P.; Tutuncuoglu, G. et al.; **Nano Letters** 18, 4, 2666–2671, (2018)

TEACHING &
MENTORING
EXPERIENCE

Wayne State University, Detroit, MI

Courses:

ECE 9997 - Doctoral Seminar (Fall 2021)

ECE 5995 - Special Topics on Nanoelectronics (Winter 2022)
ECE 4600 - Capstone Design (Fall 2022)
ECE 5580 - Advanced Nanoelectronics (Winter 2022 - **New course**)
ECE 7995 - Advanced Semiconductor Manufacturing (Fall 2023 - **New course**)

Mentored Students:

Md Tawsif Rahman Chowdhury - PhD Student
Alireza Moazzeni - PhD Student
Avinash Dutt - Master Student
Ahmedul Khan - Master Student
Riley Hilton - Summer REU Student 2022
Kieran Vacek - Summer REU Student 2023

EPFL, Lausanne, Switzerland

Master Thesis and Project Co-Supervisor (2012-2016)
Bachelor and Master Project Co-Supervisor (4 Students), Master Thesis Co-Supervisor (3 Students)

Sabanci University, Istanbul, Turkey

Coordinator of Moderator Education Program in Academic Support Program (2008-2010)
Teaching Assistant of Thermodynamics course in Sabanci University, Istanbul, Turkey (Spring 2009)
Calculus and Natural Sciences 101 & 102 Tutor in Academic Support Program (2006-2007)

SERVICE

ECE Search Committee, ECE Outreach Committee Chair
Chair of American Vacuum Society, Michigan Chapter
Chair of IEEE - Southeastern Michigan – Woman in Engineering Affinity
Guest Editor of Nanomaterials - Special Issue on Thermal Transport in Nanoscale
Review Panelist of National Science Foundation: Electrical, Communications and Cyber Systems (ECCS),
Electronic, Photonic, and Magnetic Devices (EPMD)
Faculty participant at NSF Research Experiences for Undergraduates: Summer Academy in Sustainable
Manufacturing
Reviewer for Nanotechnology, Nanomaterials, Nanoscale, MRS Advances, Biosensors journals
Member of IEEE, Materials Research Society (MRS)

LECTURES AND
INVITED
SEMINARS

- Invited Seminar at Synopsys Academic Speaker Series, February 2024
- Invited Seminar at American Vacuum Society Annual Michigan Section Meeting, June, 2023
- ECE Department Seminar: Defect-engineering as a Route Towards Controlled Ionic-Transport Pathways in Synaptic Devices, hosted by ECE Department, at Michigan State University, USA, April 2022
- ABC Seminars: Engineering Nanoscale Devices for Novel Computing Paradigms hosted by Physics and Astronomy Department, at Wayne State University, USA, December 2021
- ECE Department Seminar: Semiconductor Nanostructures and Their Applications in Optoelectronics, Nanoelectronics and Novel Computing Devices, hosted by Wayne State University, ECE Department, USA, July 2020
- Optoelectronic Properties of III-V Nanostructures Grown by Molecular Beam Epitaxy hosted by Prof. Paul McIntyre, at Stanford University, USA, September 2017

- Phase Engineering of III-V Nanostructures Grown by Molecular Beam Epitaxy hosted by Prof. Harry Atwater, at California Institute of Technology, USA, July 2016
- III-V Nanostructures grown by Molecular Beam Epitaxy and Research at EPFL hosted by Prof. Cleva Ow Yang, at Sabanci University, Istanbul, Turkey, November 2015
- Optical Properties of Nanowires (Raman and PL Spectroscopy) *lecture on behalf of Prof. Anna Fontcuberta i Morral, at Pulse Summer School – Epitaxy Updates and Promises Porquerolles, France, September 2015

- PRESENTATIONS
- Crystal Phase Prediction of GaAs Nanowires with Machine Learning (Poster)
Machine Learning in Science and Engineering 2019, Atlanta, USA
 - Thermal Transport in Si Nanowires with Axially Modulated Diameters
MRS Fall 2018, Boston, USA
 - Defect-Free GaAs Nanostructures by Controlling the Orientation
MRS Fall 2016, Boston, USA
 - III-V Nanowires, Growth Challenges and Applications in Next Generation Photovoltaics * Invited talk on behalf of Prof. Anna Fontcuberta i Morral
CIMTEC 2016 Perugia, Italy, June 2016
 - Quantum Heterostructures Based on GaAs Nanomembranes for Photonic Applications
2016 IEEE Photonics Society Summer Topical Meeting Series Newport Beach, USA
 - III-V Nanowire-Based Heterostructures Grown with MBE
NanoTR-10 2014, Istanbul, Turkey

- HONORS AND AWARDS
- Georgia Tech Chemical and Biomolecular Engineering Department Postdoc Fellowship (February 2017)
 - Selected as the only participant of Turkey in Lindau Nobel Laureate Meetings Lindau, Germany (July 2016)

- SUBMITTED AND IN PREPARATION
1. Exploring Self-Directed Channel Memristor Device Metrics and Variability: Avinash Dutt, Alireza Moazzeni, Gozde Tutuncuoglu; Submitted to DRC 2024