

MEENAKSHI UPADHYAYA

2 Marcus Hall, 100 Natural Resources Road, Amherst, MA
<https://meenakshiupadhyaya.github.io/>

✉ mupadhyaya@umass.edu
☎ (413) 801-9133

EDUCATION

- **Ph.D. Electrical and Electronics Engineering** 2020(Expected)
University of Massachusetts Amherst, Amherst, MA
Dissertation: Thermoelectric Transport in Disordered Organic and Inorganic Materials.
Advisor: Prof. Zlatan Aksamija, NanoEnergy & Thermophysics Lab
- **M.Tech. Nanotechnology** 2013
Vellore Institute of Technology, Vellore, India
Thesis: Charge Transport in Disordered Organic Semiconductor Based Devices.
- **B.E. Electronics and Communication Engineering** 2010
Visvesvaraya Technological University, India
Senior Project: High Speed Parallel-Prefix VLSI Ling Adder

RESEARCH EXPERIENCE

- **Research Assistant**, University of Massachusetts Amherst 2014 – present
 - Simulated thermal transport in Silicon alloy thin-films, superlattices and nanocomposites based on the Boltzmann transport equation.
 - Monte Carlo based simulation study of levy walk and non-diffusive heat conduction in Silicon alloy nanowires utilizing the Massachusetts green high-performance computing center.
 - Numerically modeled thermoelectric transport in conducting polymers based on iteratively solving the non-linear Pauli's master equation in MATLAB.
 - Collaborated with Prof. Dhandapani Venkataraman's group (Department of Chemistry, UMass Amherst) to study the role of charge transport dynamics in determining the thermoelectric properties of disordered semiconducting polymers.
 - Collaborated with Prof. Ajla Aksamija's group (Department of Architecture, UMass Amherst) to design and test thermoelectric assemblies for integration into building facade systems for heating and cooling applications.
- **Research Assistant**, Jawaharlal Nehru Centre for Advanced Scientific Research 2012 – 2014
 - Numerically modeled the current and noise characteristics of a polymer solar cell using the kinetic Monte Carlo technique in Fortran.
 - Collaborated with experimental chemists to study the impact of structural and electronic properties of polymers in limiting the efficiency of the cell.

INDUSTRIAL EXPERIENCE

- **Trainee Design Engineer (R&D)**, Radel Electronics Pvt. Ltd., Bangalore, India 2010 – 2011
 - Designed, and developed the production and test plan for a speed switch unit for a Dornier aircraft,
 - Circuit design and programming microcontrollers for Radel digital electronic musical instruments.

TEACHING EXPERIENCE

- **Teaching Associate**, University of Massachusetts Amherst
 - ENG191 Freshmen Engineering Seminar Fall 2018
- **Teaching Assistant**, University of Massachusetts Amherst
 - ECE331 Hardware organization and design Spring 2018
 - ECE310 Circuits and Electronics II 2019 – 20 (2 semesters)
 - ECE124 Introduction to Digital and Computer Systems 2019 – 20 (2 semesters)
- **Mentor**, Summer engineering institute, University of Massachusetts Amherst Summer 2019

AWARDS

- **David Navon Scholarship** for research in microelectronics, UMass Amherst 2015
- **Outstanding Teaching Assistant**, ECE UMass Amherst. 2019
- Won second place in the UMass ECE 3-minute thesis competition 2020

RESEARCH INTERESTS

Computational electronics; Thermoelectrics; Nanoscale heat transfer; Organic semiconductors

SKILLS

Programming Languages: MATLAB, Python, Fortran, C, Verilog

Computational tools: Synopsys - Sdevice, Sprocess and Medici, MOSES, Virtual Nanolab, Synopsys – Formality, Design Compiler (DC), Cadence Encounter, ModelSim, Xilinx ISE, PSpice

Application Software: Typesetting (LATEX, Microsoft Word); Graphics (Adobe Illustrator)

Elementary experience in using Optical Microscope, AFM, STM, Spin Coating Unit, Metal Evaporation Unit and Chemical vapor deposition.

JOURNAL PUBLICATIONS

1. C. J. Boyle*, M. Upadhyaya*, et al., Tuning charge transport dynamics via clustering of doping in organic semiconductor thin films, *Nature Communications* 10, 2827 (2019). [*Equal contribution] [\[Link\]](#)
2. M. Upadhyaya, C. J. Boyle, et al., Effects of Disorder on Thermoelectric Properties of Semiconducting Polymers, *Scientific Reports* 9, 5820 (2019). [\[Link\]](#)
3. A. Aksamija, Z. Aksamija, C. Counihan, D. Brown, M. Upadhyaya, Experimental Study of Operating Conditions and Integration of Thermoelectric Materials in Facade Systems, *Frontiers in Energy Research* 7, 6 (2019). [\[Link\]](#)
4. M. Upadhyaya, Z. Aksamija, Non-diffusive Lattice Thermal Transport in SiGe Alloy Nanowires, *Physical Review B* 94, 174303 (2016). [\[Link\]](#)
5. M. Upadhyaya, N. S. Khatami, and Z. Aksamija, Engineering Nanostructured SiGe Alloys for Low Thermal Conductivity in Thermoelectric Applications, *Journal of Materials Research* 30, 2649 (2015). [\[Link\]](#)

IN PREPARATION

6. M. Upadhyaya and Z. Aksamija, Phonon Transport Dynamics in SiGe Nanocomposites.
7. M. Upadhyaya, M. Lu-Díaz, D. Venkataraman, Z. Aksamija, New approaches to modulate dopant-DOS interactions in polymer thermoelectric materials.

BOOK CHAPTER

1. M. Upadhyaya and Z. Aksamija, Thermal Conductivity of Nanostructured Semiconductor Alloys, *Handbook of Materials Modelling* (Volume II), Springer (2018). [\[Link\]](#)

CONFERENCE PROCEEDINGS

1. A. Aksamija, Z. Aksamija, M. F. Mohajer, G. Vigneau, and M. Upadhyaya, Simulation of Heating and Cooling Potential for Novel Intelligent Facades, *Proceedings of the Facade Tectonics 2020 World Congress*, Los Angeles, CA (2020).
2. Aksamija, Z. Aksamija, C. Counihan, D. Brown, and M. Upadhyaya, Experimental Study on Integration of Thermoelectric Materials in Exterior Walls for Heating and Cooling in High Performance Buildings, *Proceedings of the 5th Building Enclosure Science and Technology Conference*, Philadelphia, PA (2018).
3. Aksamija, Z. Aksamija, C. Counihan, D. Brown, and M. Upadhyaya, Thermoelectric Materials in Exterior Walls, *Proceedings of the Facade Tectonics 2018 World Congress*, Los Angeles, CA (2018).
4. M. Upadhyaya and Z. Aksamija, Phonon Transport in SiGe Alloy-Based Nanocomposites and Nanowires for Thermoelectric Applications, *Materials Research Society Proceedings*, Fall Meeting, Boston, MA (2014).

INVITED TALK

1. Energy and Transport at the Nanoscale: A "Nano" quest, Vellore Institute of Technology, Vellore, India, 2020.

CONFERENCE PRESENTATIONS

1. Effect of Coulombic Interactions and Dopant Distribution on Charge Transport Dynamics in Polymer Thermoelectrics, *Virtual Conference on Thermoelectrics*, (2020).
2. Effect of Doping Distribution on Charge Transport Dynamics in Polymer Thermoelectrics, *Materials Research Society Fall Meeting*, Boston, MA (2019).
3. Effect of Disorder on the Thermoelectric Properties of Semiconducting Polymers, *Materials Research Society Fall Meeting*, Boston, MA (2018).
4. Thermoelectric Properties of Disordered Semiconducting Polymers, *International and European Conference on Thermoelectrics*, Caen, France (July 2018).
5. Phonon Transport Dynamics in SiGe Alloy Nanowires and Nanocomposites, *Materials Research Society Spring Meeting*, Phoenix, AZ (2017).
6. Super-Diffusive Phonons: A Monte Carlo Study of the Lévy Walk Phonon Transport Dynamics in SiGe Alloy Nanowires, *58th Electronic Materials Conference*, Newark, DE (2016).

Symposium

7. Thermoelectric Properties of Disordered Semiconducting Polymers, 4th Annual UMASS ECE Ph.D. Poster Session (2016).
8. Monte Carlo study of the effects of Nano structuring on thermal transport in SiGe Nanowires, 3rd Annual UMASS ECE Ph.D. Poster Session (2015).
9. Charge Transport in Disordered Organic Semiconductors, Annual In-house Symposium, Jawaharlal Nehru Centre for Advanced Scientific Research (2013).
10. Study of Electronic properties and Band Structure of Graphene, 4th International Conference on Science, Engineering and Technology, VIT University (2012).
11. Study of Ballistic MOSFETs, 3rd International Conference on Science, Engineering and Technology, VIT University, Vellore (2011).

MEDIA

- Polymer Thermoelectrics: phys.org; sciencedaily.com; eurekalert.org; umass/newsoffice
- Thermoelectric Materials in Facade Systems: umass/magazine; offgridenergy.com

PROFESSIONAL SOCIETIES

Material Research Society (MRS)
International Thermoelectric Society (ITS)
Institute of Electrical and Electronics Engineers (IEEE)
American Physical Society (APS)

SERVICE & LEADERSHIP

- Peer Reviewer for Applied Physics Letters, Advanced Science and Physical Review B.
- Currently serving on the Engineering curriculum review panel, UMass Amherst, (2020).
- Co-Chair, Diversity and Inclusion committee, Graduate Women in STEM, UMass Amherst, (2018 – 19).
- Served on the "Safe at Work" campaign committee, UMass Graduate Women in STEM, (2017 – 18).
- Served on the Bioelectronics faculty search committee, UMass Amherst, (2017).
- Assisted in organizing engineering workshops for high school students as part of the summer engineering institute and Women in Engineering Career Day, UMass Amherst, (2017 – 19).
- Organized the UMass Electrical and Computer Engineering PhD Women's group meetings, (2015 – 16).

OTHER INTERESTS

- Stage manager and production assistant for Dreamscope Theatre Productions, Bangalore (2008 – 14).
- Foster Care Volunteer at Dakin Humane Society, Springfield, MA.
- Volunteer for People for Ethical Treatment of Animals PeTA and Animal Rights Fund, India.

REFERENCES

Zlatan Aksamija

Associate Professor, Electrical and Computer Engineering
University of Massachusetts-Amherst
Email: zlatana@engin.umass.edu; Phone: (413) 545-4694

Dhandapani Venkataraman

Professor, Chemistry
University of Massachusetts-Amherst
Email: dv@umass.edu; Phone: (413) 545-2028

Neal Anderson

Professor, Electrical and Computer Engineering
University of Massachusetts-Amherst
Email: anderson@ecs.umass.edu; Phone: (413) 545-0765

Paula Sturdevant Rees

Assistant Dean - Diversity, Equity, and Inclusion
University of Massachusetts-Amherst
Email: rees@umass.edu; Phone: (413) 545-6324