





Abhinav Malhotra

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| INFORMATION | Delaware Energy Institute 221 Academy Street, 250G University of Delaware Newark, DE 19716 USA |  +1 (404) 528-8789  E-mail: me @ abhinavm.com  Github: ABMalhotra  Scholar: bit.ly/AMPapers |
| RESEARCH INTERESTS | Sustainable Energy: Photon and electron mediated conversions, Nanoscale energy transport. Simulations: Multiscale modeling, Topologically optimized systems, Predictive design. Data Science: Machine-learning accelerated computational methods. | |
| EDUCATION | Georgia Institute of Technology (Georgia Tech), Atlanta Ph.D., Chemical Engineering Aug, 2019 M.S., Chemical Engineering July, 2018 Indian Institute of Technology (IIT), Roorkee M.Tech., Hydrocarbon Engineering June, 2013 B.Tech., Chemical Engineering May, 2012 | |
| RESEARCH EXPERIENCE | Delaware Energy Institute, University of Delaware <i>Post-Doctoral Researcher</i> Sep, 2019 – Research Theme: “Harnessing Microwave Photons for Chemical Transformations” <u>Advisor:</u> Dr. Dionosius Vlachos Georgia Institute of Technology <i>Graduate Research Assistant</i> Aug, 2014 - Aug, 2019 Dissertation: “Exploring Thermal Transport in Semiconductor Nanostructures” <u>Advisor:</u> Dr. Martin Maldovan <ul style="list-style-type: none">Developed computationally efficient techniques based on fundamental theoretical principles to predict thermal transport properties of semiconductor nanostructures.Successfully applied Beckmann-Kirchhoff surface scattering to phonon-structure interactions.Identified and elucidated the phonon-coupling mechanism in layered nanomaterials.<u>Collaborations:</u> Michael Filler, Shannon Yee (Georgia Tech); Gözde Tütüncüoğlu (TU Delft) | |
| TEACHING EXPERIENCE | <i>Teaching Assistant</i> Jan, 2015 - Dec, 2016 Assisted in teaching undergraduate and graduate level courses for the Chemical Engineering program. Responsible for weekly recitations, grading exams, and homework assignments. <ul style="list-style-type: none">CHBE-3210 Transport Phenomenon II, Spring 2015.CHBE-6100 Advanced Thermodynamics, Fall 2016. <i>Laboratory Instructor</i> Duties included maintaining lab safety, designing experiments to explain concepts of process control, interactive teaching during lab and grading lab reports. <ul style="list-style-type: none">CHBE-4400 Process Control Lab, Fall 2015. | |
| AWARDS AND HONORS | Travel Award, Machine Learning in Science and Engineering Symposium, Atlanta 2019 Travel Grant, College of Engineering, Georgia Tech 2018 Travel Grant, Student Government Association, Georgia Tech 2017 | |

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| Exemplary Academic Achievement Award (4.0 GPA in core courses), Georgia Tech | 2015 |
| Ministry of Human Resources Development Fellowship (100% funded masters), India | 2012-13 |
| Dr. B.R. Varshney Award (for top chemical engineering undergraduate), IIT Roorkee | 2011 |
| Imperial College India Foundation Fellowship ($\sim 1/\text{yr}$)* | 2014 |

* awarded – respectfully declined

PUBLICATIONS (Total first author publications = 8, online at [Google Scholar](https://scholar.google.com/citations?user=AMpPapers) or <http://bit.ly/AMPapers>)

11. Malhotra, A., and Maldovan, M.; Phononic Pathways towards Rational Design of Nanowire Heat Conduction. [INVITED REVIEW] *Nanotechnology* **30**, 372002, (2019).
10. Kothari, K., Malhotra, A., and Maldovan, M.; Cross-Plane Heat Conduction in III-V Semiconductor Superlattices. *Journal of Physics: Condensed Matter* **31**, 345301, (2019).
9. Malhotra, A., and Maldovan, M.; Thermal Transport in Semiconductor Nanotubes. *International Journal of Heat and Mass Transfer* **130**, 368, (2019).
8. Malhotra, A., Kothari, K., and Maldovan, M.; Cross-Plane Thermal Conduction in Superlattices: Impact of Multiple Length Scales on Phonon Transport. *Journal of Applied Physics* **125**, 044304, (2019).
7. Malhotra, A., Kothari, K., and Maldovan, M.; Modulating Thermal Conduction via Phonon Spectral Coupling. *Journal of Applied Physics* **124**, 124302, (2018).
6. Kothari, K., Malhotra, A., and Maldovan, M.; Unconventional Thermal Transport in Thin Film-on-Substrate Systems. *Journal of Physics D* **51**, 365302, (2018).
5. Malhotra, A., Kothari, K., and Maldovan, M.; Enhancing Thermal Transport in Layered Nanomaterials. *Scientific Reports* **8**, 1880, (2018).
4. Malhotra, A., Kothari, K., and Maldovan, M.; Spatial Manipulation of Thermal Flux in Nanoscale Films. *Nanoscale and Microscale Thermophysical Engineering* **21**(3), 145, (2017).
3. Malhotra, A., and Maldovan, M.; Surface Scattering Controlled Heat Conduction in Semiconductor Thin Films. *Journal of Applied Physics* **120**, 204305, (2016).
2. Malhotra, A., and Maldovan, M.; Impact of Phonon Surface Scattering on Thermal Energy Distribution of Si and SiGe Nanowires. *Scientific Reports* **6**, 25818, (2016).
1. Kumar, S., Arya, D., Malhotra, A., Kumar, S. and Kumar, B.; Biodegradation of dual phenolic substrates in simulated wastewater by *Gliomastix indicus* MTCC 3869. *Journal of Environmental Chemical Engineering* **1**, 865, (2013).

SCIENCE COMMUNICATION 1. Entering the Matrix: ELI5 Introduction to Eigenvalues and Eigenvectors, medium.com (June 2019).

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| ORAL PRESENTATIONS | Sabarmati Seminar, Indian Institute of Technology, Gandhinagar, India. [INVITED TALK] | 2019 |
| | American Physical Society (APS) March Meeting, Boston, USA. | 2019 |
| | American Institute of Chemical Engineers (AIChE) Annual Conference, Pittsburgh, USA. | 2018 |
| | American Physical Society (APS) March Meeting, Los Angeles, USA. | 2018 |
| | American Physical Society (APS) March Meeting, New Orleans, USA. | 2018 |
| | Georgia Tech ChBE Annual Colloquium, Atlanta, USA. | 2017 |
| | Materials Research Society (MRS) Fall Meeting, Boston, USA. | 2017 |
| | Georgia Tech ChBE Graduate Symposium, Atlanta, USA. | 2016 |
| | Materials Research Society (MRS) Fall Meeting, Boston, USA. | 2015 |

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| SERVICE | <i>Reviewer</i> , President Undergraduate Research Award proposals at Georgia Tech. | 2019 |
| | <i>Elected Representative</i> of Graduate Students to Georgia Tech Student Government. | 2017 |
| | <i>Treasurer</i> , Association of Chemical Engineering Graduate Students of Georgia Tech. | 2016 |
| | <i>Chair</i> , Hospitality Committee, ChBE Graduate Research Symposium at Georgia Tech. | 2015 |
| SCIENTIFIC MEMBERSHIPS | American Institute of Chemical Engineers (AIChE); American Physical Society (APS); Materials Research Society (MRS) | |
| OTHER PROJECTS | <i>Master's Project</i> | |
| | "Oxidative reforming of methane: Thermodynamic and Modeling Study" | |
| | <ul style="list-style-type: none"> Modeled the thermodynamics of methane to syngas conversion in MATLAB to narrow down the feasible state-space. Solved PDEs for a Ni-based tubular reactor in the feasible state-space to identify optimal operating conditions. | |
| | <i>Course: Data Analytics for Chemical Engineers</i> | |
| | <ul style="list-style-type: none"> Developed supervised machine-learning models to predict bandgaps and formation energies of transparent semiconductors using a DFT generated material database. | |
| | <i>Course: Machine Learning for Trading</i> | |
| | <ul style="list-style-type: none"> Trained a machine-learning based stock trading algorithm on time-series data to optimize performance in a simulated trading scenario. | |
| | <i>Course: Artificial Intelligence Systems</i> | |
| | <ul style="list-style-type: none"> Implemented A* search, Dynamic Bayes Nets and Q-learning in Python to improve the performance of a Pacman AI agent. | |
| | <i>Course: Computations in Material Science</i> | |
| | <ul style="list-style-type: none"> DFT calculations using VASP package to calculate electronic bandgap in graphene with molecules adsorbed. | |
| PROFESSIONAL EXPERIENCE | Jeevomics Pvt. Ltd., New Delhi, India | |
| | <i>Research Engineer</i> | July, 2013 - Aug, 2014 |
| | Created libraries of potential reaction kinetics and integrated them with in-house machine learning tools to help identify viable drugs for clients. | |
| RELEVANT SKILLS | Languages: FORTRAN, Python, MATLAB, Unix shell scripting, some use of C++, MPI. | |
| | Applications: COMSOL, L ^A T _E X, some use of Mathematica, QuantumEspresso and OpenFOAM. | |
| | Proficiency in Machine Learning Algorithms and Tools in Python and MATLAB. | |