





# 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: <a href="mailto:me@abhinavm.com">me @ abhinavm.com</a>  Github: <a href="#">ABMalhotra</a>  Scholar: <a href="https://bit.ly/AMPapers">bit.ly/AMPapers</a>
RESEARCH INTERESTS	<b>Sustainable Energy:</b> Photon and electron mediated conversions, Nanoscale energy transport. <b>Simulations:</b> Multiscale modeling, Topologically optimized systems, Predictive design. <b>Data Science:</b> Machine-learning accelerated computational methods.	
EDUCATION	<b>Georgia Institute of Technology (Georgia Tech), Atlanta</b> Ph.D., Chemical Engineering Aug, 2019 M.S., Chemical Engineering July, 2018 <b>Indian Institute of Technology (IIT), Roorkee</b> M.Tech., Hydrocarbon Engineering June, 2013 B.Tech., Chemical Engineering May, 2012	
RESEARCH EXPERIENCE	<b>Delaware Energy Institute, University of Delaware</b> <i>Post-Doctoral Researcher</i> Sep, 2019 – Research Theme: “Harnessing Microwave Photons for Chemical Transformations” <u>Advisor:</u> Dr. Dionosius Vlachos  <b>Georgia Institute of Technology</b> <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"><li>Developed computationally efficient techniques based on fundamental theoretical principles to predict thermal transport properties of semiconductor nanostructures.</li><li>Successfully applied Beckmann-Kirchhoff surface scattering to phonon-structure interactions.</li><li>Identified and elucidated the phonon-coupling mechanism in layered nanomaterials.</li><li><u>Collaborations:</u> Michael Filler, Shannon Yee (Georgia Tech); Gözde Tütüncüoğlu (TU Delft)</li></ul>	
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"><li>CHBE-3210 Transport Phenomenon II, Spring 2015.</li><li>CHBE-6100 Advanced Thermodynamics, Fall 2016.</li></ul> <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"><li>CHBE-4400 Process Control Lab, Fall 2015.</li></ul>	
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	

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](#) 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).

#### ORAL PRESENTATIONS

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

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"> <li>Modeled the thermodynamics of methane to syngas conversion in MATLAB to narrow down the feasible state-space.</li> <li>Solved PDEs for a Ni-based tubular reactor in the feasible state-space to identify optimal operating conditions.</li> </ul>	
	<i>Course: Data Analytics for Chemical Engineers</i>	
	<ul style="list-style-type: none"> <li>Developed supervised machine-learning models to predict bandgaps and formation energies of transparent semiconductors using a DFT generated material database.</li> </ul>	
	<i>Course: Machine Learning for Trading</i>	
	<ul style="list-style-type: none"> <li>Trained a machine-learning based stock trading algorithm on time-series data to optimize performance in a simulated trading scenario.</li> </ul>	
	<i>Course: Artificial Intelligence Systems</i>	
	<ul style="list-style-type: none"> <li>Implemented A* search, Dynamic Bayes Nets and Q-learning in Python to improve the performance of a Pacman AI agent.</li> </ul>	
	<i>Course: Computations in Material Science</i>	
	<ul style="list-style-type: none"> <li>DFT calculations using VASP package to calculate electronic bandgap in graphene with molecules adsorbed.</li> </ul>	
PROFESSIONAL EXPERIENCE	Jeevomics Pvt. Ltd., New Delhi, India	
	<i>Research Engineer</i>	Feb, 2014 - Aug, 2014
	Created libraries of potential reaction kinetics and integrated them with in-house machine learning tools to help identify viable drugs for clients.	
	ITC Ltd., Haridwar, India	
	<i>Assistant Manager</i>	June, 2013 - Jan, 2014
	Managed the production lines of carton packaging unit, including machine scheduling, machine crewing and skill development, to achieve production targets exceeding \$1.2M/yr.	
RELEVANT SKILLS	Languages: FORTRAN, Python, MATLAB, Unix shell scripting, some use of C++, MPI.	
	Applications: COMSOL, L <sup>A</sup> T <sub>E</sub> X, some use of Mathematica, QuantumEspresso and OpenFOAM.	
	Proficiency in Machine Learning Algorithms and Tools in Python and MATLAB.	