Abhinav Malhotra

INFORMATION	221 Academy Street, 250G University of Delaware Newark, DE 19716 USA	in LinkedIn: /in/abhinavmalhotra ✉ E-mail: me @ abhinavm.com ⚙ Github: ABMalhotra G Scholar: bit.ly/AMPapers

EDUCATION

Georgia Institute of Technology (Georgia Tech), Atlanta
Ph.D., Chemical Engineering with Minor in Computational Science — 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
Post-Doctoral Researcher — Sep, 2019 –

Research Theme: "Harnessing Microwave Photons for Chemical Transformations"
<u>Advisor</u>: Dr. Dionisios G. Vlachos

- Creating multiphysics *computational models* combining electromagnetics, thermal and momentum transport and reaction engineering to develop sustainable manufacturing.
- Developed process models to understand experimentally reported improved selectivity of alkane dehydrogenation under microwave heating.

Georgia Institute of Technology
Graduate Research Assistant — Aug, 2014 - Aug, 2019

Dissertation: "Exploring Thermal Transport in Semiconductor Nanostructures"
<u>Advisor</u>: Dr. Martin Maldovan

- Developed simulation toolset to predict thermal properties of different nanostructure geometries.
- Implemented funadamental phonon physics numerically to develop space-discrete models to evaluate role of morphologies and surfaces in heat conduction.
- Authored 10 peer reviewed articles (8 first-authored) in international scientific journals.
- Developed a multi-year research collaboration between three research groups on campus.

PROFESSIONAL EXPERIENCE

ITC Ltd., Haridwar, India
Assistant Manager — June, 2013 - Jan, 2014

Managed the production lines of carton packaging unit, including inventory, scheduling, crewing and skill development of >30 employees, to achieve production targets of $1.2M/yr.

SERVICE & LEADERSHIP

Course Content, RAPID Manufacturing Institute's Process Intensification Module. — 2020

Reviewer Panel, President Undergraduate Research Award proposals at Georgia Tech. — 2018-19

Elected Senator to Georgia Tech's Student Government. Influenced administrative policies to benefit graduate students. — 2015-2017

Treasurer, Association of Chemical Engineering Graduate Students of Georgia Tech. — 2015-2016

Chair, Hospitality Committee, ChBE Graduate Research Symposium at Georgia Tech. — 2015

Co-Convenor Events, Co-led a team of >300 volunteers at IIT Roorkee. — 2013

* awarded – respectfully declined

PEER-REVIEWED PUBLICATIONS

† Co-first authored. Citations online at Google Scholar or `http://bit.ly/AMPapers`.

14. † Tütüncüoglu, G., Malhotra, A., Kommandur, S., Yee, S., Maldovan, M., and Filler, M.; Boundary Scattering Dominates Thermal Conductivity in Diameter-modulated Si Nanowires. [IN PREPARATION]

13. † Chen, W., Malhotra, A., Zheng, W., Plaza-Gonzalez, P., Catala-Civera, J., Santamaria, J., and Vlachos, D.G.; A Stable and Intensified Microwave-Assisted Heterogeneous Catalytic Reactor. [TO BE SUBMITTED]

12. Malhotra, A., Chen, W., Goyal H., Plaza-Gonzalez, P., Catala-Civera, J., Santamaria, J., and Vlachos, D.G.; Temperature Homogeneity under Selective and Localized Microwave Heating in Structured Flow Reactors. [SUBMITTED]

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).

OTHER PUBLICATIONS

2. Understanding Indian Premier League with Data Science, *medium.com* (Feb 2020).

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

ORAL PRESENTATIONS	‡ Conducted online.	
	‡American Institute of Chemical Engineers (AIChE) Annual Conference, San Francisco, USA.	2020
	‡Faculty Seminar, Indian Institute of Technology, Ropar, India.	2020
	Sabarmati Seminar, Indian Institute of Technology, Gandhinagar, India. [INVITED]	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.	2017
	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

SCIENTIFIC MEMBERSHIPS

American Institute of Chemical Engineers (AIChE); American Physical Society (APS); Materials Research Society (MRS)

OTHER PROJECTS

Master's Project
"Oxidative reforming of methane: Thermodynamic and Modeling Study"

- 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.

Course: Data Analytics for Chemical Engineers
- Developed supervised machine-learning models to predict bandgaps and formation energies of transparent semiconductors using a DFT generated material database.

Course: Machine Learning for Trading
- Trained a machine-learning based stock trading algorithm on time-series data to optimize performance in a simulated trading scenario.

Course: Artificial Intelligence Systems
- Implemented A* search, Dynamic Bayes Nets and Q-learning in Python to improve the performance of a Pacman AI agent.

Course: Computations in Material Science
- DFT calculations using VASP package to calculate electronic bandgap in graphene with molecules adsorbed.

RELEVANT SKILLS

Languages: FORTRAN, Python, MATLAB, Unix shell scripting, some use of C++, MPI.

Applications: COMSOL, LaTeX, some use of Mathematica, QuantumEspresso and OpenFOAM.

Proficiency in Machine Learning Algorithms and Tools in Python and MATLAB.

[Last updated: November 25, 2020]