Abhinav Malhotra

INFORMATION

Delaware Energy Institute
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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"
Advisor: Dr. Dionosius Vlachos

- Creating multiphysics *computational models* to develop microwave powered reactors.

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

Dissertation: "Exploring Thermal Transport in Semiconductor Nanostructures"
Advisor: Dr. Martin Maldovan

- Created FORTRAN, Python and MATLAB codes to predict thermal energy flow in nanostructures.
- Implemented physics model 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 scientific journals.
- Developed a multi-year research collaboration between research groups on campus.

TEACHING EXPERIENCE

Teaching Assistant
Assisted in teaching undergraduate and graduate level courses for the Chemical Engineering program. Responsibile for weekly recitations, grading exams, and homework assignments.

- CHBE-3210 Transport Phenomenon II, Spring 2015.
- CHBE-6100 Advanced Thermodynamics, Fall 2016.

Laboratory Instructor
Duties included maintaining lab safety, designing experiments to explain concepts of process control, interactive teaching during lab and grading lab reports.

- CHBE-4400 Process Control Lab, Fall 2015.

PROFESSIONAL EXPERIENCE

ITC Ltd., Haridwar, India
Assistant Manager — 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.

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 (∼1/yr)*	2014

* awarded – respectfully declined

Peer-reviewed Publications

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

12. ‡ Tütüncüoglu, G., Malhotra, A., Kommandur, S., Yee, S., Maldovan, M., and Filler, M. (exp. 2020) [In preparation]
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

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

Service

Reviewer, President Undergraduate Research Award proposals at Georgia Tech.	2019
Elected Representative of Graduate Students to Georgia Tech Student Government.	2017
Treasurer, Association of Chemical Engineering Graduate Students of Georgia Tech.	2016
Chair, 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

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.