

Natalie Malka Isenberg

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Education University of Pittsburgh – B.S. Chemical Engineering, (August 2016)

Carnegie Mellon University – Ph.D Chemical Engineering, (August 2016 - Present)

Research Interests & Expertise

Mathematical modeling, mathematical optimization, mixed-integer linear programming (MILP), materials design, catalysis, alternative energy technology, process systems engineering, robust optimization

Research Experience

Carnegie Mellon University, Department of Chemical Engineering, **Graduate Student Researcher** (Fall 2016 - Present)

- Formulating and solving **mathematical optimization models** to determine optimal **materials** for CO₂ adsorption
- **Robust optimization** techniques for large-scale, non-convex **nonlinear** process models

DAAD Research Internship in Science and Engineering (RISE), **Research Intern** (Summer 2015)

- Awarded research internship in Germany to investigate effects of modified **ceramics** in energy storage processes

Swanson School of Engineering, Dr. C. Wilmer, **Undergraduate Researcher** (January 2015 – 2016)

- Developed computational methods for chemical **gas sensors** using **metal organic frameworks**

Swanson School of Engineering, Dr. G. Vesper, **Undergraduate Researcher** (May 2013 – August 2014)

- Studied effects of modified **nanoparticles** as oxygen carriers in **chemical looping combustion**

Mascaro Center for Sustainable Innovation (MCSI), Dr. G. Vesper, **Research Intern** (Summer 2014)

- Headed research project to test **dopants** in cerium dioxide **supports** for improved structural integrity and oxygen availability

Pitt Excel Summer Research Internship, Dr. G. Vesper, **Research Intern** (Summer 2013)

- Worked on optimizing oxygen utilization and stability of materials used in chemical looping combustion technology

Publications

- S. Bhavsar, N.M. Isenberg, A. More, G. Vesper, "Lanthana-doped ceria as active support for oxygen carriers in chemical looping combustion," *Applied Energy* 168 (2016): 236-247
- N.M. Isenberg, Z. Yan, M.G. Taylor, C.L. Hanselman, G. Mpourmpakis, C.E. Gounaris, "Identification of Optimally Stable Nanocluster Geometries via Mathematical Optimization and Density-Functional Theory", In Preparation (2019)

Presentations

- AIChE Annual Meeting (2018), *Identification of Optimally Stable Nanocluster Geometries via Mathematical Optimization and Density-Functional Theory*, **N.M. Isenberg**, Z. Yan, M.G. Taylor, C.L. Hanselman, G. Mpourmpakis, C.E. Gounaris
- INFORMS Annual Meeting (2018), *Mathematical Optimization Based Approaches for the Design of Materials in Energy Applications* **C.E. Gounaris**, C.L. Hanselman, N.M. Isenberg

Relevant Coursework:

Linear Programming, Integer Programming, Constraint Programming, Introduction to Machine Learning, Defects in Materials

Volunteer Experience

Carnegie Mellon University, Chemical Engineering Graduate Student Association, **Outreach Coordinator** (2017-2019)

Pennsylvania Junior Academy of Science Region 7, **Volunteer Judge** (2017 & 2018)

Carnegie Mellon University, Department of Chemical Engineering, **Teaching Assistant (TA)** (Fall 2017 - Present)

- Introduction to Chemical Engineering (Fall 2016)
- Optimization Modeling and Algorithms & Chemical Process Design (Spring 2017, Spring 2018, Spring 2019)

Propel EAST Middle School, **Volunteer Instructor** (2015 - 2016)

- Taught a weekly introductory creative programming course to elementary and middle school students

Awards and Proficiencies

Research Awards:

- 2nd Place, EQT Optimization Poster Award, CAPD Annual Review Meeting (2019)
- Bayer/Covestro Award for outstanding undergraduate students in chemical engineering (2016)
- 1st place poster presentation at “Chemical Engineering Research Day” at the University of Pittsburgh (2015)
- 1st place for undergraduate research in the Mascaro Center for Sustainable Innovation Internship (2014)
- “Best Research Mentee” in Pitt EXCEL Summer Internship (2013)

Teaching Awards:

- Mark Dennis Karl Outstanding Graduate Teaching Assistant Award (2018)
- Gelfand Student Service Award (2019)

Programming Languages: C++, Python, Java, MATLAB

Optimization Software: IBM ILOG CPLEX, Gurobi, BARON, GAMS, Pyomo

Languages: Fluent in Hebrew, proficient in Spanish