

SUMMARY

PhD candidate with 3+ years of experience with computational chemical kinetics and open-source software development using Python and varied industry experience through the MIT Chemical Eng. Practice School and Georgia Tech co-op program.

EDUCATION

Massachusetts Institute of Technology, Cambridge, MA Anticipated Feb 2020
Ph.D. Chemical Engineering GPA: 4.8/5.0

Massachusetts Institute of Technology, Cambridge, MA June 2017
M.S. Chemical Engineering Practice GPA: 4.8/5.0
– Received the William C. Rousseau Award in Leadership and Ethics in Chemical Engineering Practice

Georgia Institute of Technology, Atlanta, GA May 2014
B.S. Chemical and Biomolecular Engineering with Highest Honors GPA: 3.98/4.00

WORK EXPERIENCE

Graduate Research Assistant May 2015 – Present
Massachusetts Institute of Technology, Department of Chemical Engineering, Cambridge, MA

- Advised by Prof. William Green, focusing on kinetic modeling of polycyclic aromatic hydrocarbon formation
- Lead developer of Reaction Mechanism Generator, an open-source program used by many industry and academic groups worldwide for automatically generating detailed reaction mechanisms
- Maintaining the RMG website, a Django site which allows users to directly access many RMG features
- Performing quantum chemistry calculations to determine thermochemical and kinetic parameters

Practice School Consultant Apr 2016 – May 2016
Woodside Energy, Perth, Western Australia, Australia

- Resolved mass balance discrepancies in high pressure fuel gas system via meter calibration and data reconciliation
- Designed and analyzed novel 3D printable heat exchanger designs using Solidworks and computational fluid dynamics

Practice School Consultant Feb 2016 – Mar 2016
MedImmune, Gaithersburg, MD

- Developed software to simplify data analysis for hydrogen-deuterium exchange mass spectrometry
- Explored structure-property relationships of antibody solutions through experimental and computational methods

Undergraduate Research Assistant Jan 2013 – Aug 2013
Georgia Institute of Technology, School of Chemical and Biomolecular Engineering, Atlanta, GA

- Worked in Prof. Yulin Deng's research group, focused on development of polyoxometalate based fuel cell
- Designed and constructed fuel cell assemblies with the aid of Autodesk Inventor

R&D Engineer Co-op May 2011 – Dec 2012
Georgia Pacific Gypsum, Decatur, GA

- Investigated new formulations and lab-scale methods for improving wallboard and underlayment products
- Created preliminary designs for future pilot-scale production line at R&D facility

SKILLS

Technical skills:

- Proficient: Microsoft Word/Excel/PowerPoint/Visio, Python, MATLAB, LaTeX, git, Mathematica, Aspen Plus, Q-Chem, Gaussian, CHEMKIN
- Some experience: Cython, Django, Pelican, Vim, Bash, Linux, HTML+CSS, COMSOL, Simulink, Solidworks

Foreign languages:

- Chinese (native speaker), French (basic proficiency)

PUBLICATIONS

- Chu, T-C.; Buras, Z.; Oßwald, P.; **Liu, M.**; Goldman, M.; Green, W. H. Modeling of aromatics formation in fuel-rich methane oxy-combustion with an automatically generated pressure-dependent mechanism. *Phys. Chem. Chem. Phys.* Submitted.
- **Liu, M.**; Green, W. H. Capturing Aromaticity in Automatic Mechanism Generation. *Proc. Combust. Inst.* 2018, In Press.
- Lai, L.; Gudiyella, S.; **Liu, M.**; Green, W. H. Chemistry of Alkylaromatics Reconsidered. *Energy & Fuels* 2018, 32 (4), 5489–5500.
- Class, C. A.; **Liu, M.**; Vandeputte, A. G.; Green, W. H. Automatic Mechanism Generation for Pyrolysis of Di-Tert-Butyl Sulfide. *Phys. Chem. Chem. Phys.* 2016, 18, 21651–21658.
- Liu, W.; Mu, W.; **Liu, M.**; Zhang, X.; Cai, H.; Deng, Y. Solar-Induced Direct Biomass-to-Electricity Hybrid Fuel Cell Using Polyoxometalates as Photocatalyst and Charge Carrier. *Nat. Commun.* 2014, 5, 3208.

PRESENTATIONS

- **Liu, M.**; Green, W. H. Improved aromaticity handling and ring perception in RMG to model PAH formation. ACS National Meeting, Aug 2018.
- **Liu, M.**; Goldman, M. J.; Grinberg Dana, A.; Johnson, M. S.; Han, K.; Green, W. H. Advances in Predictive Kinetic Modeling Using Reaction Mechanism Generator. 37th International Symposium on Combustion, Aug 2018.
- **Liu, M.** Automated Reaction Mechanism Construction: Overview & Current Status. 4th International Workshop on Flame Chemistry. Jul 2018.
- **Liu, M.**; Han, K.; Green, W. H. Going bigger: Capturing PAH chemistry in RMG. 10th International Conference on Chemical Kinetics, May 2017.
- **Liu, M.**; Lai, L.; Carr, A.; Class, C.; Monroe, T.; Green, W. H. Supercritical Water Treatment of Alkyl Aromatics: Observations Beyond Model Predictions. AIChE Annual Meeting, Nov 2015.

TEACHING EXPERIENCE

Graduate Teaching Assistant

Feb 2017 – Jun 2017

Massachusetts Institute of Technology, Department of Chemical Engineering, Cambridge, MA

- Led office hours and review sessions for helping students with homework and before exams
- Proctored and graded exams, and coordinated homework grading

Undergraduate Teaching Assistant

Aug 2011 – May 2014

Georgia Institute of Technology, School of Mathematics, Atlanta, GA

- Taught recitation sessions of approx. 35 students twice a week per class, one to two classes per semester
- Wrote, proctored, and graded quizzes and exams, and held weekly office hours

VOLUNTEERING AND ACTIVITIES

- MIT Video Game Orchestra: Student-led group focused on arranging and performing music from various video games
- NetPals: Outreach program to connect with local middle schoolers about STEM fields via email exchanges
- MIT Archery Club and Georgia Tech Archery Club
- Georgia Tech Tau Beta Pi, Marketing Chair