

Kaitlin Engle Mallouk

PhD Candidate

Air Quality Engineering & Science
Department of Civil & Environmental Engineering
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EDUCATION

- University of Illinois at Urbana-Champaign. Urbana, IL** Expected May 2013
Ph.D. in Environmental Engineering in Civil Engineering
Certificate in Energy and Sustainability Engineering
Certificate in Foundations of Teaching
“Capture and Recovery of Organic Gases with Electrothermal Swing Adsorption and Post-Desorption Treatment”. Advisor: Mark J. Rood.
- University of Illinois at Urbana-Champaign. Urbana, IL** 2007 – 2009
M.S. in Environmental Engineering in Civil Engineering
“Capture and Recovery of Isobutane with Activated Carbon Fiber Cloth (ACFC) and Electrothermal Desorption”. Advisor: Mark J. Rood.
- Cornell University. Ithaca, NY** 2001-2005
B.S. in Chemical Engineering, *magna cum laude*

FELLOWSHIPS AND SCHOLARSHIPS

1. *National Science Foundation Graduate Research Fellowship*, 2009-2012.
2. *Civil & Environmental Engineering (CEE) Alumni Graduate Assistantship for Teaching Excellence*, 2011-2012, Department of CEE, University of Illinois (U of I).
3. *Mavis Future Faculty Fellowship*, 2011-2012 and 2012-2013, College of Engineering, U of I. (awarded by the College of Engineering to 12 students based on academic performance and interest in and potential to contribute to engineering education).
4. *Milton Feldstein Memorial Scholarship*, Air & Waste Management Association (A&WMA), 2009-2010 (one-year scholarship awarded annually to one graduate student).
5. *Graduate Assistance in Areas of National Need (GAANN) Fellowship*, 2007-2012, Department of CEE, U of I.
6. *Support for Underrepresented Groups in Engineering (SURGE) Fellowship*, 2007-2012, College of Engineering, U of I.

AWARDS

1. *List of Teachers Ranked as Excellent by their Students*
 - As primary instructor: CEE446: Air Quality Engineering. U of I, Fall 2011.
 - As teaching assistant: CEE546: Air Quality Control. U of I, Spring 2010.
2. *Doctoral Student Paper Award, 2nd Place*. A&WMA 104th Annual Conference & Exhibition (ACE) 2011.

3. *Environmental Chemistry Graduate Student Award*. American Chemical Society, 2011.
4. *Masters Student Paper Award, 1st Place*. A&WMA 102nd ACE 2009.
5. *Travel Award from Lake Michigan States Chapter of A&WMA* (2009 - \$250, 2010 - \$300).
6. *Racheff Student Travel Award*, CEE, U of I (2009 - \$500, 2010 - \$300).

TEACHING AND MENTORING EXPERIENCE

1. *Teaching Fellow*, U of I, Department of CEE, CEE446: Air Quality Engineering, Fall 2011.
 - Held full responsibility for the course including creating the course syllabus, schedule, assignments, and exams and presenting material through class sessions.
 - Taught the principles of Air Quality Engineering to 30 seniors and first-year graduate students and two online students with three scheduled contact hours per week.
 - Utilized active learning techniques to enhance student learning.
 - Developed unique group project assignments with a focus on developing solutions to open-ended problem based in an area of active research.
 - Interacted with students during class and office hours to answer questions regarding the course, jobs in the environmental engineering field, and graduate school options.
2. *Mentor to Undergraduate Researcher*, U of I, Department of CEE, Spring 2011-present
 - Developed an independent, meaningful research project for an undergraduate student.
 - Trained student in lab techniques including flow calibration and isotherm measurement.
 - Supervised student progress through regular meetings and emails.
3. *Teaching Assistant*, U of I, Department of CEE, CEE 546: Air Quality Control, Spring 2010.
 - Taught combustion fundamentals and aerosol mechanics in a small class setting using a combination of lecture and short problem solving sessions.
 - Designed and graded problem sets and exam questions.
 - Held office hours to answer student questions.
4. *Mentor to Undergraduate Engineering Students*, U of I, Women in Engineering and Society of Women Engineers, Spring 2008 – present
 - Acted as a mentor in formal and informal settings to engineering undergraduates.
 - Met with formal mentee on a regular basis to discuss coursework, career path, job opportunities, and life as an engineer.
 - Provided encouragement and advice to informal mentees when needed.
5. *Coordinator*, Girls Adventures in Mathematics, Engineering, & Science – Chemical Engineering Camp, Women in Engineering, U of I, 2008-2009.
 - Designed curriculum and handbook in conjunction with a faculty mentor to expose 9th and 10th grade students to chemical engineering.
 - Taught 34 students of various cultural and socioeconomic backgrounds about the importance of chemical engineering and separation processes in chemical engineering.
 - Implemented an economics competition to underscore the importance of economics in engineering design decisions.

- Coordinated and supervised four teaching assistants to ensure each learning module was appropriately staffed and the campers were engaged in the material.
6. *Teaching Assistant*, Cornell University, Department of Chemical and Biomolecular Engineering, ChemE 112: Introduction to Chemical Engineering, Fall 2004.
 - Graded problem sets as part of a teaching assistant team.
 - Held weekly office hours to help students with solving problem sets.

RESEARCH EXPERIENCE

1. *Research Assistant*, U of I, Department of Civil and Environmental Engineering, Principle Investigator: Mark J. Rood. 2007 – present.
 - Investigating the use of electrothermal swing adsorption with post-desorption treatment to capture low concentration organic gases and recover them as liquids for reuse.
 - Modifying and testing an automated bench-scale experimental apparatus for use with organic gases including the addition of a pressure and temperature control system.
 - Evaluating several ACFCs by determining their adsorption capacities for organic gases spanning boiling points $> 60^{\circ}\text{C}$.
 - Developing mass and energy models to describe the bench-scale system and aid in determining the potential for scale-up.
 - Obtained skills in: photoionization detection, flame ionization detection, gas chromatography, process automation, and LabView programming.
2. *Research Assistant*, Cornell University, Department of Biomedical Engineering, Principle Investigator: Lawrence Bonassar, 2004-2005.
 - Participated in an independent undergraduate research opportunity in a tissue-engineering laboratory.
 - Held responsibility for completing a research project over the course of an academic year through experimental planning, execution, and results interpretation.
 - Determined measurable characteristics of injection-molded hydrogels used for tympanic membrane repair implants.
 - Explored methods of manufacturing implants in an aseptic environment.
 - Fostered research relationships with a senior faculty member, research scientist, and graduate students.

WORK EXPERIENCE

1. *Biochemical Engineer*, Merck & Co., Inc. West Point, PA. 2005-2007.
2. *Intern*, The Dow Chemical Company, DowPharma Division. Midland, MI. 2004.
3. *Intern*, Cordis Corporation, Analytical Research and Development. Warren, NJ. 2002, 2003.

PUBLICATIONS

Peer Reviewed Publications

1. **Mallouk, K.E.**, Johnsen, D.L., Rood, M.J., (2010) Capture and recovery of isobutane by electrothermal swing adsorption with post-desorption liquefaction. *Environmental Science and Technology (ES&T)*, **44**. 7070-7075.
2. Johnsen, D.L., **Mallouk, K.E.**, Rood, M.J., (2010) Electrothermal heating control during regeneration of ACFC. *ES&T*. **45**. 738-743.

Publications in Progress

1. **Mallouk, K.E.**, Rood, M.J. (In preparation). Effect of Adsorbate Boiling Point on the Performance of an Electrothermal Swing Adsorption System with Post Desorption Liquefaction.
2. **Mallouk, K.E.**, Rood, M.J. (In preparation). Selective Capture and Recovery of Isobutane from a Humid Air Stream Using Electrothermal Swing Adsorption.

Patents

1. Rood, M., **Mallouk, K.**, Johnsen, D., Hay, K.J., (2010) Gas purification system and method for liquefaction of dilute gas components. 12/827,630. Application filed to the US Receiving Office.

Peer Reviewed Conference Proceedings

1. **Mallouk, K.E.**, Rood, M.J., (2012) Characterization of Adsorption of Select Organic Gases on Activated Carbon Fiber Cloth, *A&WMA's 105th ACE*, San Antonio, TX, No. 65, 12 pp.
2. **Mallouk, K.E.**, Johnsen, D.L., Rood, M.J., (2011) Energy Efficiency During Capture and Recovery of Organic Gases with ACFC, Electrothermal Desorption, and Post-Desorption Treatment, *A&WMA's 104th ACE*, Orlando, FL, No. 53, 14 pp.
3. **Mallouk, K.E.**, Johnsen, D.L., Rood, M.J., (2010) Capture and Recovery of Organic Gases with ACFC, Electrothermal Desorption, and Post-Desorption Treatment, *A&WMA's 103rd ACE*, Calgary, AB., No. 85, 10 pp.
4. **Mallouk, K.E.**, Johnsen, D.L., Rood, M.J., Hay, K.J., (2009) Capture and Recovery of Organic Gases for Reuse, *A&WMA's 102nd ACE*, Detroit, MI., No. 66, 9 pp.

Invited Presentations

1. **Mallouk, K.E.**, (2010) Gardasil™: Purification and Production of a Commercial Biologic, Chemical and Biomolecular Engineering 471: Biochemical Engineering, Special Topics Lecture, U of I.

Student Presentations and Seminars

1. **Mallouk, K.E.**, "Characterization of Adsorption of Select Organic Gases on Activated Carbon Fiber Cloth," Poster presentation, *18th Environmental Engineering Symposium*, U of I, April 2012.

2. **Mallouk, K.E.**, Johnsen, D.L., Rood, M.J. (2011) Energy Efficiency for Capture and Recovery of Isobutane Using Electrothermal Swing Adsorption and Post-Desorption Liquefaction, *Association of Environmental Engineering and Science Professors (AEESP) Research & Education Conference*, Tampa, FL, July 10-12, 2011, Poster Presentation.
3. **Mallouk, K.E.**, “Capture, Recovery, and Condensation of Organic Gases for Reuse,” Graduate Student Seminar, U of I, Jan 2010.
4. **Mallouk, K.E.**, “Capture and Recovery of Organic Gases for Reuse,” Platform presentation, *15th Environmental Engineering Spring Symposium*, U of I, April 2009.
5. **Mallouk, K.E.**, “Recovery of Butane with ACFC,” Platform presentation, *14th Environmental Engineering Spring Symposium*, U of I, April 2008.

Technical Reports

1. Rood, M.J., **Mallouk, K.E.**, Johnsen, D.L., (2010) Isobutane Recovery for Reuse Project, Final Report, Submitted to Pregis Corporation.

GRANTS AND FUNDING PROPOSALS

Co-authored the following funded proposals:

1. Rood, M.J., **Mallouk, K.E.**, Johnsen, D.L. Adsorption Isotherms for Gas Capture and Recovery System. (2011). Sponsored Research Agreement (SRA) with Pregis Corporation. **\$10,000**.
2. Rood, M.J., **Mallouk, K.E.** Butane Recovery for Reuse. (2008). SRA with Pregis Corporation. **\$88,297**.

Co-authored the following submitted proposals:

1. Rood, M.J., **Mallouk, K.E.**, Johnsen, D.L. Manufacturing Efficiency Improvements through Carrier Gas Recycling Using a Novel Adsorption System: Concept Paper. (2012). Advanced Research Projects Agency – Energy (ARPA-E). U.S. Department of Energy. **\$250,000-\$999,999**, under review.
2. Crabtree-Ide, C.R., Ram, P.K., Ide, M.C., **Mallouk, K.E.** Clearing the Air: Fans and Filters to Prevent Pneumonia. (2011). Gates Foundation Grand Challenges in Global Health Exploration Proposal. **\$100,000**, not funded.

PROFESSIONAL SERVICES

1. *Member*, AEESP Education Committee, 2011-present. Initiated a membership-wide survey to collect contact information for members willing to share course materials.
2. *Peer Reviewer*, Industrial & Engineering Chemistry Research, 2010-present.
3. *Member*, Environmental Engineering Graduate Student Advisory Committee, 2008-2011. *Chair*, 2009-2010.
4. *Co-Chair*, Program and Abstracts Committee, 14th Environmental Engineering Spring Symposium, Urbana, IL, March 2008.
5. *Member*, U of I Department of CEE Committee on Energy Use, 2008-2010.
6. *Judge*, FIRST Lego League Regional Competition, Urbana, IL, 2009.

PROFESSIONAL MEMBERSHIP

1. Association of Environmental Engineering and Science Professors (AEESP), 2008 – present.
Education Committee Member, 2011-present.
2. Air & Waste Management Association (A&WMA), 2008 – present.
3. American Institute of Chemical Engineers (AIChE), 2010 – present.
4. American Chemical Society (ACS), 2010-present.
5. Society of Women Engineers (SWE), 2011-present.

PROFESSIONAL DEVELOPMENT & TRAINING

Participated in the following education courses and workshops:

1. Service-Learning in Engineering, Technology and Computing, Frontiers in Education (FIE) Conference, Rapid City, SD, October 2011.
2. Innovation for a Crowded Curriculum: Learning Modules for Tomorrow's Energy Engineers, Presented by Professor Donna Riley, FIE Conference, Rapid City, SD, October 2011.
3. Navigating the Academic Job Search, AEESP Research and Education Conference, Tampa, FL, July 2011.
4. North Carolina State University Building Future Faculty Program, Raleigh, NC, April 2011.
5. College Teaching and Academic Careers, Education, Organization, & Leadership 585. U of I, Spring 2010.
6. Learning Theories and Teaching, Center for Teaching Excellence (CTE), U of I, Nov 2009.
7. Academic Integrity, CTE, U of I, October 2009.
8. Sharp'n Your Oral Presentation Skills, A&WMA ACE. Detroit, MI, 2009.
9. Creating Effective Teams: From Problems to Solutions, CTE, U of I, June 2008.
10. Pulling it all Together: Course and Syllabus Design, CTE, U of I, June 2008.

REFERENCES

1. Mark J. Rood, Ivan Racheff Professor of Environmental Engineering
Department of Civil & Environmental Engineering / University of Illinois
217-333-6963, mrood@illinois.edu
2. Tami C. Bond, Associate Professor
Department of Civil & Environmental Engineering / University of Illinois
217-244-5277, yark@illinois.edu
3. Michael C. Loui, Professor and University Distinguished Teacher-Scholar
Department of Electrical and Computer Engineering / University of Illinois
217-333-2595, loui@illinois.edu
4. Yuanhui Zhang, The Innoventor Professor in Engineering
Department of Agricultural and Biological Engineering / University of Illinois
217-333-2693, yzhang1@illinois.edu