

ALLISON LIM

1500 Illinois Street, Golden, CO, 80401 · 650.245.3801 · allisonlim@mines.edu

EDUCATION

Colorado School of Mines

Ph.D., Materials Science

Advisor: Dr. Alan Sellinger

Dec. 2020 (expected)

Harvey Mudd College

B.S., Materials Chemistry, ACS Certified

May 2016

RESEARCH EXPERIENCE

Colorado School of Mines Graduate Student

NSF Graduate Research Fellow

Aug. 2016 - present

June 2018 - present

Project: Improving the efficiency and material properties of plastic scintillators for neutron and gamma ray discrimination

Mentors: Dr. Alan Sellinger, Dr. Uwe Greife

Key Results:

1. Designed, synthesized, and purified fluorescent small molecules for detection of neutrons and gamma rays on milligram to multigram scales
2. Screened polysiloxane resins for optimal material properties in order to develop a novel class of elastomeric radiation detectors
3. Collaborated with an interdisciplinary team of nuclear engineers, physicists, and chemists
4. Mentored 2 graduate and 2 undergraduate students in applied organic chemistry techniques
5. Experience in understanding structure-property relationships of organic/polymer/hybrid materials for solar cells and organic light emitting diodes (OLEDs) as part of a multi-disciplined applied chemistry research group

Sandia National Laboratories, Graduate Student Intern

May - Dec. 2019

Project: Organic glass scintillators for neutron and gamma ray discrimination

Mentors: Dr. Patrick L. Feng, Dr. Joey Carlson

Key Results:

1. Synthesized gram-scale quantities of fluorene based glass forming small molecules via Grignard reagents and lithium-halogen exchange.
2. Demonstrated synthesized molecules could be melt cast into stable bulk scintillators as well as blended with other glass forming molecules while still maintaining radiation detection capabilities.
3. Explored photo-polymerized organic glass - poly(vinyl toluene) composites formulations for fabrication of scintillators in non-traditional form factors, including pixels for neutron imaging.

Harvey Mudd College, Undergraduate Research Assistant

Aug. 2015 - May 2016

Project: Fabrication of Dye-Sensitized Solar Cells with Dual-Layer Zinc Oxide Nanostructures

Mentor: Dr. Hal Van Ryswyk

Objective: Fabricate and characterize dual layer zinc oxide nanosheets via single step electrochemical deposition for photoanodes in dye sensitized solar cells.

University of New South Wales, Undergraduate Research Assistant

May - Aug. 2015

Project: Development of Single Phase High Entropy Alloys

Mentors: Dr. Lori Bassman (Harvey Mudd College), Dr. Kevin Laws (University of New South Wales)

Objective: Develop a precious metal, single phase high entropy alloy system.

California Institute of Technology, Summer Undergraduate Research Fellow

May - Aug. 2014

Project: Band Edge Manipulation of Si(111) Surfaces for Water Splitting Applications

Mentors: Dr. Nathan Lewis, Dr. Noah Plymale

Objective: Manipulate band edge of Si via surface functionalization for water splitting applications.

SKILLS AND INSTRUMENTATION EXPERIENCE

Experimental Techniques: Small molecule and monomer synthesis/purification/characterization, bulk polymerization, Schlenk chemistry, glovebox, microwave synthesis, flash chromatography, SLA additive manufacturing

Molecular/Polymer Characterization: NMR, GC-MS, FTIR, UV-Vis, PL, TCSPC, GPC, contact angle measurements

Material Characterization/Instrumentation: TGA, DSC, photo-DSC, SEM/EDS

Software: MATLAB, Mathematica, Python, LaTeX, SolidWorks

PUBLICATIONS

5. **Lim, A.**; Arrue, J.; Rose, P. B.; Sellinger, A.; Erickson, A. S. Polysiloxane Scintillators for Efficient Neutron and Gamma-Ray Pulse Shape Discrimination. *ACS Appl. Polym. Mater.* **2020**. doi:10.1021/acsapm.0c00641
4. **Lim, A.**; Hernandez, G.; Latta, J.; Yemam, H. A.; Senevirathna, W.; Greife, U.; Sellinger, A. Methacrylate-Functionalized 2,5-Diphenyloxazole for Use as Fluorescent Monomers in Plastic Scintillators. *ACS Appl. Polym. Mater.* **2019**, *1* (6), 1420–1429. doi:10.1021/acsapm.9b00188.
3. **Lim, A.**; Mahl, A.; Latta, J.; Yemam, H. A.; Greife, U.; Sellinger, A. Plastic Scintillators with Efficient Light Output and Pulse Shape Discrimination Produced via Photoinitiated Polymerization. *J. Appl. Poly.*, **2019**, *136* (15), 47381. doi:10.1002/app.47381.
2. Mahl, A.; **Lim, A.**; Latta, J.; Yemam, H. A.; Greife, U.; Sellinger, A. Methacrylate Based Cross-Linkers for Improved Thermomechanical Properties and Retention of Radiation Detection Response in Plastic Scintillators. *NIMA*, **2018**, *884*, 113–118. doi:10.1016/j.nima.2017.11.091.
1. Plymale, N. T.; Ramachandran, A. A.; **Lim, A.**; Brunschwig, B. S.; Lewis, N. S. Control of the Band-Edge Positions of Crystalline Si(111) by Surface Functionalization with 3,4,5-Trifluorophenylacetylenyl Moieties. *J. Phys. Chem. C*, **2016**, *120* (26), 14157–14169. doi:10.1021/acs.jpcc.6b03824.

SELECTED PRESENTATIONS

Lim, A., Mahl, A., Latta, J., Yemam, H. A., Greife, U., Sellinger, A. Photopolymerized Plastic Scintillators Capable of Neutron and Gamma Ray Discrimination. American Nuclear Society, Washington D.C. **Nov. 2019. Invited, Oral**

Lim, A., Mahl, A., Latta, J., Yemam, H. A., Greife, U., Sellinger, A. Plastic Scintillators with Efficient Light Output and Pulse Shape Discrimination Produced via Photo-Initiated Polymerization. American Chemical Society, Orlando, FL. **April 2019. Oral**

Lim, A., Mahl, A., Latta, J., Yemam, H. A., Greife, U., Sellinger, A. Cross-linked and Photopolymerized Plastic Scintillators Capable of PSD. CWMD 2018 Academic Research Initiative Review for Nuclear Sensing Technologies, Knoxville, TN. **Poster**

Lim, A., Van Ryswyk, H. Single-step electrodeposition of zinc oxide nanosheets on a compact layer for dye-sensitized solar cell photoanodes. American Chemical Society, San Diego, CA. March 2016. **Poster**

HONORS AND AWARDS

NSF Graduate Research Fellowship Program (GRFP) *June 2018 - present*
National award funding graduate students for 3 years

Innovations in Nuclear Technology R&D Award (First Place) *Aug. 2019*
Recognizes graduate students nationwide for innovations in fields related to nuclear technology

Harald V. Johnson Prize for Effective Communication of Chemistry *May 2016*
Awarded to one graduating student for outstanding communication of chemistry to the community and general public

American Institute of Chemists Award for Leadership and Advancement *May 2016*
National award received by two graduating seniors nominated by faculty

TEACHING EXPERIENCE

Colorado School of Mines, Graduate Teaching Assistant

- Prepared pre-laboratory lectures and troubleshoot general chemistry laboratory for 90 undergraduate students
- Tutored students and explained challenging concepts from the laboratory as well as course sections of general chemistry

Harvey Mudd College, Undergraduate Teaching Assistant

- Assisted in troubleshooting general chemistry laboratory for 30 undergraduate students

COMMUNITY ENGAGEMENT

Rocky Mountain MESA, Colorado School of Mines *Jan. 2019 - present*
Lead deployment of mentor training in the new statewide MESA program. Assisted in curriculum review and development to prepare high school students for the national MESA competition.

Skype a Scientist *Jan. 2018 - present*
Led discussions about materials science, radiation detection, and the role of a scientist via video conference to students in middle school and high schools across the U.S.

Science Bus, Harvey Mudd College *Sept. 2012 - May 2016*
Taught weekly hands-on science experiments in under-funded elementary schools. Restructured and reorganized the club as president to double number of volunteers and classrooms.

Homework Hotline, Harvey Mudd College

Sept. 2014 - May 2016

Promoted a Homework Hotline, a free, over the phone tutoring service run by student tutors, by meeting and speaking with local school administration and faculty. Performed basic data analysis to improve caller and tutor experience.

OTHER (INTERESTS AND HOBBIES)

Claremont-Mudd-Scripps Varsity Soccer

Sept. 2012 - May 2015

Division III soccer for Harvey Mudd College

Colorado School of Mines, Women's Club Soccer

Sept. 2012 - May 2015