Greeshma Gadikota

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RESEARCH INTERESTS

Multi-scale reaction kinetics and gas transport mechanisms for connecting nano and meso-scale measurements with field-scale observations using molecular dynamics techniques, advanced synchrotron characterization methods, and conventional lab-scale measurements

- Chemical and morphological tuning of the products of reaction-driven gas separation and storage
- Gas adsorption, diffusion, and partitioning behaviors at solid-water interfaces
- Integration of the enhanced recovery of essential fuels and resources with safe and permanent intercalation or storage of environmentally hazardous gases and materials
- ***Key application areas:*** CO_2 capture, conversion, utilization, and storage; nuclear waste disposal; sustainable hydrocarbon extraction; tracers for hydrocarbon migration; drilling fluids for oil and gas exploration; metal cycling in the environment;

ACADEMIC EXPERIENCE

2016 – present **Post-Doctoral Research Associate**, Department of Civil and Environmental Engineering, Princeton University

2015 – present **Research Associate**, National Institute of Standards and Technology (NIST), MD

2014 – 2015 **Post-Doctoral/Associate Research Scientist**, Department of Earth and Environmental Engineering & Department of Chemical Engineering, Columbia University

2014 – 2015 **Technical Coordinator**, NSF Research Coordination Network - Carbon Capture, Utilization and Storage (RCN-CCUS), Columbia University

2010 – 2014 **Graduate Research Assistant**, Department of Chemical Engineering, Columbia University

EDUCATION

Ph.D. Chemical Engineering, Columbia University, NY, USA (2014)

Thesis title: "Geo-Chemo-Physical Studies of Carbon Mineralization for Natural and Engineered Carbon Storage"

M.S. Chemical Engineering, Columbia University, NY, USA (2011)

M.S. Operations Research, Columbia University, NY, USA (2008)

B.S. Chemical Engineering, Michigan State University, MI, USA (2007) (Graduated Top of the Chemical Engineering Class of 2007)

AWARDS and HONORS

Selected as "Civil and Environmental Engineering Rising Stars" by Massachusetts Institute of Technology and invited to attend the workshop, Boston, MA (2015)

Selected as the Best Presentation in "Novel Gas-Liquid and Gas-Liquid-Solid Reaction Pathways for Sustainable Energy and Environment I" Session, The 12th International Conference on Gas-Liquid and Gas-Liquid-Solid Reactor Engineering, New York, NY (2015)

Selected as the Best Presentation in "Carbon Capture, Control and Sequestration" Session, AICHE Conference, Pittsburgh, PA (2012)

Outstanding Reviewer Recognition by *Chemical Engineering Science* and *Desalination* (2015)

Travel Grant to perform neutron scattering experiments at the NIST Center for Neutron Research (2016)

Travel Grant to attend The Gordon Research Conference on Carbon Capture, Utilization, and Storage (2015)

Travel Grant awarded by Earth Institute, Columbia University (2010)

Invited to attend highly selective DOE-NETL workshop: Research Experience in Carbon Sequestration (RECS), Birmingham, AL (2013)

Society of Women Engineers Outstanding Chemical Engineering Undergraduate Award, Michigan State University (2007)

Sigma Xi Outstanding Scientific Research Award, Michigan State University (2006)

AIChE Donald F. Othmer Sophomore Academic Excellence Award, Michigan State University (2005)

PROFESSIONAL ACTIVITIES and SERVICES

- American Chemical Society (ACS)
- Materials Research Society (MRS)
- American Institute of Chemical Engineers (AIChE)
- Full Member, Sigma Xi
- Member, Tau Beta Pi (National Engineering Honors Society)
- Member, Omega Chi Epsilon (Chemical Engineering Honors Society)

Outreach Activities

- Volunteer at the Womensphere Emerging Leaders Global Summit 2014: The Next Generation of Women Leaders Transforming the World, New York, NY (Jan. 16, 2014).
- Science lecture at the Birch Wathen Lenox School (3rd and 4th grade students), New York, NY (Jan. 24, 2014).

Reviewer and Conference Activities

- Regularly review manuscripts for the **journals** including
  Chemical Engineering Science, Chemical Engineering Journal, Environmental Science & Technology, Fuel, Minerals, Desalination, Journal of Cleaner Production, Journal of Hazardous Materials
- Topic Editor of the Special Issue, "Accelerated Carbonation for Environmental and Material Engineering" in *Frontiers in Carbon Capture, Storage, and Utilization* (2015)
- Review proposals for The Engineering and Physical Sciences Research Council (EPSRC) in UK (2015) and the American Chemical Society - Petroleum Research Fund (ACS-PRF) (2016)

- Co-chair of AIChE session, "Fundamental and Applied Catalysis for CO_2 Conversion into Fuels and Chemicals" (Salt Lake City, UT; November 2015)
- Co-chair of AIChE session, "Fluidization and Fluid-Particle Systems for Energy and Environmental Applications II" (Salt Lake City, UT; November 2015)
- Chair of The 12th International Conference on Gas-Liquid and Gas-Liquid-Solid Reactor Engineering (GLS12) session, "Novel Gas-Liquid and Gas-Liquid-Solid Reaction Pathways for Sustainable Energy and Environment" (New York, NY; June 2015)
- Chair of The Fifth International Conference on Accelerated Carbonation for Environmental and Material Engineering (ACEME 2015) session, "Utilization of the Carbonated Materials I" (New York, NY; June 2015)
- Chair of ACS session, "Enhanced Extraction & Utilization of Unconventional Energy Sources: Hydrofracking, EOR and Novel Approaches" (Denver, CO; March 2015)
- Co-chair of AIChE session, "Circulating Fluidized Beds and Measurement Techniques in Fluid-Particle Systems" (Atlanta, GA; November 2014)
- Judge for Sigma Xi Student Research Showcase (March 18-23, 2013 and March 17-23, 2014)

PUBLICATIONS

Peer Reviewed Articles including Journal Publications and Book Chapters

(* as corresponding author)

1. G. Gadikota,* F. Zhang, and A. J. Allen, "Microstructural and structural characterization of Na-montmorillonite and Ca-montmorillonite on heating to 1150^{o}C using *in-situ* and *in-operando* multi-scale X-ray scattering methods," *Journal of Alloys and Compounds* (*in review*).

2. G. Gadikota* & A. J. Allen, "Microstructural and structural characterization of materials for CO_2 storage using multi-scale X-ray scattering methods," *Materials and Processes for CO_2 Capture, Conversion, and Sequestration, Wiley Books*, Eds. Lan Li and Winnie Wong-Ng (**2016**) - *invited book chapter (in print).*

3. G. Gadikota*, "Commentary: Ex-situ aqueous mineral carbonation," *Frontiers in Energy Research Special Issue: The Fifth International Conference on Accelerated Carbonation for Environmental and Material Engineering (ACEME 2015)* (**2016**).

4. G. Gadikota, K. Fricker, S.-H. Jang & A.-H. A. Park, "Carbonated silicate minerals and industrial wastes as construction materials," *Advances in CO_2 Capture, Sequestration, and Conversion, ACS Books*, Ed. Fangming Jin (**2015**) - *invited book chapter*

5. G. Gadikota & A.-H. A. Park, "Accelerated carbonation of Ca- and Mg-bearing minerals and industrial wastes using CO_2," *Carbon Dioxide Utilization: Closing the Carbon Cycle, Elsevier,* Ed. Peter Styring (**2014**) – *invited book chapter*

6. B. Smit, A.-H. A. Park, & G. Gadikota, "The Grand Challenges in Carbon Capture, Utilization, and Storage," *Frontiers in Energy Research*, 2, 55 (**2014**). **DOI:** 10.3389/fenrg.2014.00055

7. G. Gadikota, E. J. Swanson, H. Zhao & A.-H. A. Park, "Experimental design and data analyses for accurate estimation of reaction kinetics and conversion for carbon mineralization," *I&EC Research*, 53(16), 6664–6676 (**2014**). **DOI:** 10.1021/ie500393h

8. G. Gadikota, P. Kelemen, J. Matter & A.-H. A. Park, "Chemical and morphological changes during olivine carbonation for CO_2 Storage in the presence of NaCl and $NaHCO_3$," *Physical*

Chemistry Chemical Physics, 16, 4679-4693 (**2014**). **DOI:** 10.1039/C3CP54903H

9. G. Gadikota, C. Natali, C. Boschi & A.-H. A. Park, "Morphological changes during enhanced carbonation of asbestos containing material and its comparison to magnesium silicate minerals," *Journal of Hazardous Materials*, 264, 42-52 (**2014**). **DOI:** 10.1016/j.jhazmat.2013.09.068

10. I. Volov, X. Sun, G. Gadikota, P. Shi & A. C. West*, "Electrodeposition of copper-tin alloys films for interconnect applications," *Electrochimica Acta*, 89, 792-797 (**2013**). **DOI:** 10.1016/j.electacta.2012.11.102

Peer-Reviewed Technical Reports

1. S. Brown, K. S. Campbell, G. Gadikota, A. Howe, & N. Mac Dowell, "CCS Forum Report," IChemE Energy Centre, London, UK (**2016**).

2. J. Wilcox, A.-H. A. Park, G. Gadikota & P. Goodrich, "Advances in energy efficiency via separations technology," a report exclusively for members of the Carbon Dioxide Capture & Conversion (CO2CC) of The Catalyst Group Resources (TCGR) (**2014**).

Manuscripts in preparation

1. G. Gadikota, B. Dazas, & I. C. Bourg*, "Gas adsorption and partitioning behavior between interlayer nanopores and bulk using molecular dynamics simulations"
2. G. Gadikota, F. Zhang, A. J. A. Allen, R. Andrews, & I. C. Bourg, "Nano- and meso-scale adsorption and partitioning of CO_2 and CH_4 in Na-montmorillonite at elevated temperatures and pressures using molecular dynamics simulations and X-ray scattering methods"
3. G. Gadikota,* F. Zhang, & A. J. Allen, "Microstructural and structural characterization of illite and kaolinite on heating to 1150^{o}C using *in-situ* and *in-operando* multi-scale X-ray scattering methods"
4. G. Gadikota,* F. Zhang, & A. J. Allen, "In-situ pore morphological changes during the adsorption and desorption of CO_2 and CH_4 in Na-montmorillonite and illite using ultra small and small angle neutron scattering (USANS/SANS"

Patents & Disclosures

1. A.-H. A. Park, E. J. Swanson, H. Zhao, G. Gadikota, P. V. Brady, T. Patel & S. Banta, "Methods and Systems for Capturing and Storing Carbon Dioxide" WO/2013/022896 (**2013**).

Proceedings (Not Peer Reviewed)

1. G. Gadikota, C. Natali, C. Boschi & A.-H. A. Park, "Carbonation of Asbestos for Permanent Storage of Anthropogenic CO_2," *Proceedings of ACEME11: The Fourth International Conference on Accelerated Carbonation for Environmental and Materials Engineering*, April 10-12, 2013.

CONFERENCE PRESENTATIONS

(oral presentations unless indicated otherwise, includes upcoming presentations)

1. G. Gadikota & I. C. Bourg, "Molecular dynamics simulations of H_2 in Clay Interlayer Nanopores," 2016 MRS Fall Meeting, Phoenix, AZ, November 29, 2016.
2. G. Gadikota, F. Zhang, & A. Allen, "The evolution of structure-property relationships during heating in clays for nuclear waste depositories: a combined ultra-small, small-, and wide-angle X-ray scattering investigation," 2016 MRS Fall Meeting, Phoenix, AZ, November 29, 2016.

3. G. Gadikota & I. C. Bourg, "Gas adsorption and partitioning from clay interlayer nanopores," DOE - Basic Energy Sciences Annual Meeting for *The Nanoscale Basis for Geologic Storage of CO_2*, October 26-28 2016, Salt Lake City, UT, October 27-28, 2016.
4. G. Gadikota & I. C. Bourg, "Gas adsorption and partitioning from clay interlayer nanopores," DOE Basic Energy Sciences Annual Meeting for *The Nanoscale Basis for Geologic Storage of CO_2*, October 26-28 2016, Salt Lake City, UT, October 27-28, 2016.
5. G. Gadikota, "Dynamic characterization of clays for CO2 storage using molecular dynamics simulations and X-ray scattering methods," MS&T Meeting 2016, Salt Lake City, UT, October 26, 2016 - ***invited talk***.
6. G. Gadikota & I. C. Bourg, "Molecular dynamics simulations of clay-water-gas interactions for sustainable energy and environment," 252nd ACS National Meeting, Philadelphia, PA, August 21, 2016.
7. G. Gadikota, A. J. Allen, F. Zhang, & A.-H. A. Park, "In-situ and in-operando investigations of CO_2 interactions with shales using USAXS/SAXS/WAXS for sustainable hydrocarbon extraction and permanent storage of CO_2," 2016 MRS Spring Meeting, Phoenix, AZ, March 31, 2016.
8. G. Gadikota, "CO_2 for waste remediation and enhanced hydrocarbon recovery," The CCS Leaders Forum, London, UK, February 12, 2016.
9. G. Gadikota, "CCS developments in North America," The Second CCS Forum, Athens, Greece, December 15-16, 2015. **- *invited keynote lecture***
10. G. Gadikota, A. Allen, F. Zhang, & A.-H. A. Park, "Unconventional hydrocarbon extraction from geologic formations with carbon storage potential," Carbon Management Technology Conference, Sugarland, TX, November 17- 19, 2015.
11. G. Gadikota, A. Allen, F. Zhang, & A.-H. A. Park, "In-situ multi-scale characterization of the adsorption and desorption behaviors of CO_2 with shale for sustainable extraction of unconventional hydrocarbons," AIChE annual meeting, Salt Lake City, UT, November 8-13, 2015.
12. G. Gadikota, K. Jones, & A.-H. A. Park, "Physical and chemical interactions of shale with supercritical CO_2 for enhanced unconventional hydrocarbon extraction," The 12th International Conference on Gas-Liquid and Gas-Liquid-Solid Reactor Engineering (GLS 12), New York, NY, June 28- July 1, 2015. **- *selected as the best paper of the session***
13. G. Gadikota, K. Fricker, & A.-H. A. Park, "Enhanced water-gas-shift reaction and in-situ carbon fixation in the presence of $Mg(OH)_2$ slurry in a high pressure aqueous system," The 12th International Conference on Gas-Liquid and Gas-Liquid-Solid Reactor Engineering (GLS 12), New York, NY, June 28- July 1, 2015.
14. G. Gadikota, M. diDonato, M. Naibryf, A. Polettini, & A.-H. A. Park, "Accelerated carbonation of Ca- and Mg-bearing alkaline materials for permanent storage of CO_2," The Fifth International Conference on Accelerated Carbonation for Environmental and Material Engineering (ACEME 2015), New York, NY, June 21-24, 2015 (Poster Presentation).
15. G. Gadikota, X. Zhou, & A.-H. A. Park, "Carbonated silicate minerals and industrial wastes as sustainable construction materials," The Fifth International Conference on Accelerated Carbonation for Environmental and Material Engineering (ACEME 2015), New York, NY, June 21-24, 2015.
16. G. Gadikota, J. Matter, P. Kelemen, & A.-H. A. Park, "Comparison of mineral carbonation behavior of olivine, labradorite, anorthosite, and basalt for CO_2 storage," The Fifth International Conference on Accelerated Carbonation for Environmental and Material Engineering (ACEME 2015), New York, NY, June 21-24, 2015.
17. G. Gadikota and A.-H. A. Park, "Carbon mineralization for CO_2 utilization, and storage", Research Experience in Carbon Sequestration (RECS) - DOE-NETL Sponsored Workshop, Birmingham, AL, June 10, 2015 **- *Invited Lecture***

18. G. Gadikota, J. Zaat, & A.-H. A. Park, "CO_2 Interactions with Natural and Engineered Materials for Sustainable Energy," Gordon Research Conference - Carbon Capture, Utilization & Storage, Stonehill College, Easton, MA, May 31- June 5, 2015.
19. C. Zhou, G. Gadikota, E. Swanson, M. Rayson, G. Brent, & A.-H. A. Park, "Accelerated carbonation of heat-treated serpentine for permanent carbon storage," Gordon Research Conference - Carbon Capture, Utilization & Storage, Stonehill College, Easton, MA, May 31- June 5, 2015.
20. G. Gadikota, S.-W. Yip, & A.-H. A. Park, "Investigation of chemical and morphological changes in shale-supercritical CO_2-water systems for sustainable unconventional hydrocarbon extraction," 249th ACS National Meeting, Denver, CO, March 22-26, 2015.
21. G. Gadikota, X. Zhou, S.-H. Jang & A.-H. A. Park, "Synthesis and evaluation of sustainable construction materials via mineralization of CO_2 from energy production cycles," 249th ACS National Meeting, Denver, CO, March 22-26, 2015 (Poster Presentation).
22. G. Gadikota & A.-H. A. Park, "Enhanced CO_2 interactions with shale for sustainable extraction of tight oil and gas," AIChE annual meeting, Atlanta, GA, November 16 – 21, 2014.
23. G. Gadikota & A.-H. A. Park, "Fixation of CO_2 into solid mineral matrix via in-situ and ex-situ enhanced weathering," AIChE annual meeting, Atlanta, GA, November 16 – 21, 2014 (Poster Presentation).
24. K. Fricker, G. Gadikota, & A.-H. A. Park, "Integration of CO_2 capture and storage with the water-gas-shift reaction in a high pressure aqueous system for sustainable energy conversion," AIChE annual meeting, Atlanta, GA, November 16 – 21, 2014.
25. G. Gadikota and A.-H. A. Park, "CO_2 storage via carbon mineralization", Research Experience in Carbon Sequestration (RECS) - DOE-NETL Sponsored Workshop, Birmingham, AL, June 4, 2014 - ***Invited Lecture***
26. G. Gadikota, A.-H. A. Park, P. Kelemen, & J. Matter, "Geo-chemo-physical studies of carbon mineralization for natural and engineered carbon storage", 1st Annual CCUS Research Coordination Network Meeting, New York, NY, April 14-16, 2014 (Poster Presentation).
27. E. J. Swanson, G. Gadikota, T. Patel, P. V. Brady, S. Banta & A.-H. A. Park, "Carbon mineralization using chemical and biological catalysts as a novel carbon capture scheme", 246th ACS National Meeting, Indianapolis, IN, September 8-12, 2013.
28. G. Gadikota, C. Natali, C. Boschi & A.-H. A. Park, "CO_2 utilization for the treatment of asbestos containing material and its comparison to enhanced carbonation of magnesium silicate minerals", 246th ACS National Meeting, Indianapolis, IN, September 8-12, 2013.
29. J. Matter, P. Kelemen, A.-H. A. Park, & G. Gadikota, "Geo-chemo-mechanical studies for permanent storage of CO_2 in geologic formations", Carbon Storage R&D Project Review Meeting: Developing the Technologies and Building the Infrastructure for CO_2 Storage, Pittsburgh, PA, August 20-22, 2013.
30. G. Gadikota & A.-H. A. Park, "Morphological and chemical changes during mineral weathering for natural and engineered carbon storage", US-Korea Conference 2013, East Rutherford, NJ, August 7-11, 2013.
31. G. Gadikota & A.-H. A. Park, "Chemical and morphological changes during carbon mineralization for anthropogenic CO_2 Storage", International Fine Particles Research Institute Annual Meeting, Newark, DE, June 16-20, 2013. (Poster Presentation)
32. G. Gadikota, C. Natali, C. Boschi & A.-H. A. Park, "Carbonation of asbestos for permanent storage of anthropogenic CO_2," The 4th International Conference on Accelerated Carbonation for Environmental and Materials Engineering, Leuven, Belgium, April 10-12, 2013.
33. G. Gadikota and A.-H. A. Park, "Accelerated carbonation of silicate minerals for safe and permanent storage of anthropogenic CO_2," 142nd Society of Mining, Metallurgy & Exploration Annual Meeting, Denver, CO, Feb. 24-27, 2013.

34. G. Gadikota, J. Matter, P. Kelemen & A.-H. A. Park, "Geo-chemo-mechanical studies for permanent CO_2 Storage in geologic reservoirs," AIChE annual meeting, Pittsburgh, PA, October 28 – Nov. 1, 2012.
35. G. Gadikota, B. Srinivasan, V. Venkatasubramanian & A.-H. A. Park, "A hybrid model-based framework for the HAZOP analysis of geological storage of carbon dioxide," AIChE annual meeting, Pittsburgh, PA, October 28 – Nov. 1, 2012. - ***selected as the best paper of the session***
36. A.-H. A. Park, G. Gadikota, J. Matter, and P. Kelemen, "Geo-chemo-mechanical studies for permanent CO_2 storage in geologic reservoirs," U.S. DOE Carbon Storage R&D Project Review Meeting: Developing the Technologies and Building the Infrastructure for CCUS, Pittsburgh, PA, August 21-23, 2012.
37. G. Gadikota, H. Zhao and E. Swanson and A.-H. A. Park, "Natural and Engineered Carbon Mineralization in Geologic Formations for Permanent Storage of CO_2," U.S. DOE Carbon Storage R&D Project Review Meeting: Developing the Technologies and Building the Infrastructure for CCUS, Pittsburgh, PA, August 21-23, 2012. (Poster Presentation)
38. G. Gadikota, H. Zhao, P. Kelemen & A.-H. A. Park, "Carbon mineralization via carbonation of calcium and magnesium-bearing minerals as permanent storage of anthropogenic CO_2," The 28th International Pittsburgh Coal Conference, Pittsburgh, PA, Sept., 12-15, 2011.
39. G. Gadikota & A.-H. A. Park, "Thermodynamic and Kinetic Studies of Mineral Trapping of Carbon in Geologic Formations," AIChE annual meeting, Salt Lake City, UT, November 7-12, 2010.

RESEARCH SUPERVISION

M.S. Students:

- Margaret Pittman (Fall 2014 - Fall 2015): "Heavy metal immobilization using functionalized proppants for sustainable energy extraction
- Joel Zaat (Fall 2014 - Spring 2014): "Effect of dry vs. wet CO_2 on the morphological changes in shale due to interactions"
- Shih Wing Yip (Fall 2013 – present): "Characterization of polyethylenimine-modified sorbents for CO_2 capture"
- Merve Yurual (Fall 2013 – present): "Technical routes for the sustainable recovery of precious metals and disposal of treated e-waste"
- Alison Fankhauser (Fall 2012 - Spring 2013): "Comparison of the dissolution behavior of various minerals for carbon storage" [Currently PhD student in the Department of Chemical Engineering at Columbia University]
- Sishi Chen (Spring 2013): "Determination of the changes in the surface area and pore volume of labradorite before and after carbonation"
- Marissa Smatlak (Spring 2013): "Characterization of the physical alteration of olivine due to dissolution and carbonation"

Undergraduate Research Students:

- Charlie Wu (Summer 2015 – present): "Effect of impurities on dry reforming of shale gas"
- Micaela Naibryf (Summer 2014 - Fall 2014): "Particle and pore size characterizations of cement and lime kiln dust for permanent CO_2 storage"
- Frederic Enea (Spring 2013 – present): "Methods to determine precise and accurate carbon

content in minerals and rocks"

- Colette McCullagh (Spring 2014 – present): "Alteration of heat-treated asbestos for CO_2 storage"
- Lia Bersin (Spring 2011): "Optimization of the reaction conditions to achieve optimal conversion of silicate bearing minerals to carbonates"

TEACHING EXPERIENCE

- Carbon Sequestration, Guest Lecturer, Columbia University, Spring 2015
- A Better Planet by Design, Guest Lecturer, Columbia University, Spring 2014
- Particle Technology, Guest Lecturer, Columbia University, Fall 2014 and Spring 2015
- Chemical Engineering Thermodynamics, *Teaching Fellow*, Columbia University, Spring 2011
- Transport Phenomena II, *Teaching Fellow*, Columbia University, Spring 2010
- Transport Phenomena I, *Teaching Fellow*, Michigan State University, Summer 2007
- Material and Energy Balances, Chemical Reactions Engineering and Transport Phenomena, *Grading Assistant*, Michigan State University, Fall 2006 - Summer 2007

GRANTS & RESEARCH FUNDING

Beamtime proposal requests

- **PI:** "SAXS/XAFS studies to investigate heavy metal immobilization in clays at elevated temperature" - Beamtime awarded at Argonne National Laboratory, Chicago, IL from 2016-2018 - Fan Zhang (Co-PI) and Andrew Allen (Co-PI).
- **PI:** "USAXS/SAXS/WAXS studies to investigate the changes in microstructure and crystal structures of clays at elevated temperatures and pressures" - Beamtime awarded at Argonne National Laboratory, Chicago, IL from 2016-2018 - Fan Zhang (Co-PI) and Andrew Allen (Co-PI).
- **PI:** "In-situ SANS studies of the adsorption-desorption behavior of CO_2 with clays" - Beamtime awarded at the NIST Center for Neutron Research, Gaithersburg, MD from 2016-2018 - Fan Zhang (Co-PI), Andrew Allen (Co-PI), and Laura Espinal (Co-PI).
- **PI:** "USAXS/SAXS/WAXS studies to investigate the changes in pore volume and chemical composition of hydrated magnesium silicates for permanent CO_2 storage via conversion of silicates to carbonates" - Beamtime awarded at Argonne National Laboratory, Chicago, IL from 2015-2017 - Fan Zhang (Co-PI) and A.-H. Alissa Park (Co-PI).
- **PI:** "USAXS studies to investigate the changes in pore volume of shales when reacted in CO_2 and water" - Beamtime awarded at Argonne National Laboratory, Chicago, IL from 2015-2017 - A.-H. Alissa Park (Co-PI).
- **PI**: "XRD and microtomography studies to investigate the effect of supercritical CO_2 on altering the morphological features of shale for efficient extraction of oil or gas" – Beamtime awarded at Argonne National Laboratory, Chicago, IL from 2014-2016 - A.-H. Alissa Park (Co-PI) and Andrew Chizmeshya (Co-PI).
- **PI:** "SAXS studies to investigate the structure of Nanoparticle Organic Hybrid Materials for CO_2 capture and utilization" - Beamtime awarded at Argonne National Laboratory, Chicago, IL from 2015-2017 - A.-H. Alissa Park (Co-PI).

Funded Grants

- **Co-PI:** "The 12th International Conference on Gas-Liquid and Gas-Liquid-Solid Reactor Engineering (GLS 12)" - funded by The National Science Foundation from July 1, 2015 - June 30, 2016 - Kevin Chin (PI). Funding Amount: $ 25,000 for 1 year.
- **Co-PI:** "In-situ Carbonation of Mineral Tailings using CO_2 provided via Direct Air Capture" - funded by ORICA Mining, Australia from October 1, 2014 -September 30, 2016 - A.-H. Alissa Park (PI) and Klaus Lackner (Co-PI). Funding Amount: $ 200,000 for 2 years.
- **Co-PI:** "Accelerated Carbonation of Heat-treated Serpentine in the Presence of Chemical and Biological Catalysts" - funded by ORICA Mining, Australia from October 1, 2014 -September 30, 2016 - A.-H. Alissa Park (PI) and Klaus Lackner (Co-PI). Funding Amount: $ 200,000 for 2 years.
- **Co-PI:** "Engineering Strategies for a Sustainable Food Supply Chain," United Engineering Foundation, $ 62,000 (01/01/2015-12/31/2015) - Darlene Schuster (PI, AIChE), Catherine Peters (Co-PI, Princeton University), A. H. Alissa Park (Co-PI, Columbia University), Uta Krogmann (Co-PI, Rutgers University), and Callie Babbitt (Co-PI, Rochester Institute of Technology).
- **Co-PI:** "CO_2 capture and Cellulose dissolving based on ionic liquids," Chinese Academy of Science, $300,000, (03/01/2013-12/31/2016). – funds will be spent in China. Suojiang Zhang (PI), co-PIs include A.-H. Alissa Park, Camille Petit and Kunyi-Andrew Lin (Columbia University).