

## CONTACT INFORMATION

Hildebrand Department of Petroleum and Geosystems Engineering  
The University of Texas at Austin  
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## EDUCATION

**Stanford University**, Stanford, California USA  
Ph.D., Energy Resources Engineering, January 2019  
Advisor: Anthony R. Kovscek  
Dissertation: *Fluid-Fluid, Fluid-Mineral Interactions and Reactive Transport in Porous Media*  
Ph.D. minor, Mechanical Engineering, January 2019  
Advisor: John A. Dabiri (now at Caltech)

**University of Toronto**, Toronto, Ontario Canada  
M.A.Sc., Mechanical Engineering, June 2014  
Advisor: David A. Sinton  
Thesis: *Microfluidic Visualization of Phase and Flow Phenomena Related to Carbon Dioxide Transport and Usage*  
B.A.Sc., Engineering Science, June 2012  
Advisor: Brent E. Sleep  
Thesis: *Two Phase Dynamics in Porous Media with Applications to Carbon Sequestration*

## CURRENT AND PREVIOUS ACADEMIC POSITIONS

University of Texas at Austin	
Assistant Professor, Petroleum and Geosystems Engineering	January 2019 - present
Anadarko Petroleum Corporation Centennial Fellowship #1	August 2024 - present
George H. Fancher Assistant Professor	September 2020 - August 2024
Affiliated Faculty, Center for Subsurface Energy and the Environment	January 2019 - present
Affiliated Faculty, Texas Materials Institute	September 2020 - present
Affiliated Faculty, Battery Research Group	September 2021 - present
Co-Director, UT Austin Critical Minerals Group	September 2021 - present

## INTERESTS

**ACADEMIC** I am interested in understanding and controlling the fundamental geochemical processes that determine the formation and recovery of earth resources to achieve energy and environmental sustainability. My current research develops and uses novel micro/nano-visualization approaches to study the geochemical mechanisms underlying processes including critical minerals recovery, solid CO<sub>2</sub> storage, and energy storage to enable an energy transition toward sustainability and carbon neutrality. Our group combines experimentally-obtained visual observations with machine learning-based image processing and geochemistry theory to inform predictive model development.

**TEACHING** My primary teaching goal is to educate students with fundamental knowledge in the geosciences and engineering, and an ability to think critically and creatively to equip students to meet our society's rising demands towards energy and environmental sustainability. I aim to help develop their ability and passion towards advancing fundamental geosciences and engineering knowledge. I am interested in teaching both basic and applied courses in sustainability, energy resources, subsurface flow and transport, fluid mechanics, thermodynamics, geochemistry, and general courses in energy and environmental resources to develop the next generation of leaders in the geosciences and engineering.

## **HONORS and AWARDS**

Scialog Fellow in Sustainable Minerals, Metals and Materials (SM3), 2024  
Speaker, Gordon Research Conference on Flow and Transport in Permeable Media, 2024  
Scialog Fellow in Negative Emissions Science (NES), 2023  
Arie van Weelden Award, European Association of Geoscientists and Engineers (EAGE), 2023  
UT Austin Nominee, Moore Inventor Fellows Award, 2022  
Speaker, Gordon Research Conference on Liquid Phase Electron Microscopy, 2022  
NSF CAREER Award, 2022  
UT Austin Nominee, Johnson & Johnson WiSTEM<sup>2</sup>D Award, 2020  
Fellow, George H. Fancher Professorship in Petroleum and Geosystems Engineering, 2020–present  
American Chemical Society Petroleum Research Fund Doctoral New Investigator Award, 2020–2022  
Protégé of Larry W. Lake, The Academy of Medicine, Engineering, and Science of Texas, 2020  
Gerald J. Lieberman Fellowship, 2018-2019  
Gordon Research Conference (Microfluidics, Physics and Chemistry of) Best Poster Award, 2017  
Gordon Research Seminar (Flow and Transport in Permeable Media) Discussion Leader, 2016  
Petroleum Research School of Norway STEP Scholarship, 2016  
Hormoz and Fariba Ameri Graduate Education Fellowship in Earth Sciences, 2015-2018  
Society of Petroleum Engineers Calgary Section Scholarship, 2104  
4th World Petroleum Council Youth Forum Student Invitation Fellowship, 2013  
Queen Elizabeth II Graduate Scholarship in Science and Technology, 2013–2014  
MIE Research Symposium Best Poster Presentation Award, 2013  
Carbon Management Canada International Research Exchange Fellowship, 2013  
Gordon Cressy Award for Student Leadership, 2012  
Engineering Science Research Opportunities Program Fellowship, 2009

## **MEMBERSHIPS IN PROFESSIONAL AND HONORARY SOCIETIES**

Member, Society of Engineering Science (SES)  
Member, Society of Petroleum Engineers (SPE)  
Member, American Chemical Society (ACS)  
Member, American Association of Petroleum Geologists (AAPG)  
Member, Geochemical Society (GS)  
Member, Academy of Association for the Advancement of Science (AAAS)  
Member, Society of Women Engineers (SWE)

## UNIVERSITY COMMITTEE ASSIGNMENTS

### Departmental-

Faculty Speaker, Senior Banquet, PGE, UT Austin, 2024  
Chair, Simple Concepts Competition, PGE, UT Austin, 2024–present  
Member, Ad Hoc Search Committee for Director of Center for Subsurface Energy and the Environment (CSEE), UT Austin, 2023–present  
Member, Consultative Committee for Selection of PGE Department Chair, UT Austin, 2023  
Faculty Advisor, Women in Petroleum and Geosystems Engineering, UT Austin, 2022–present  
Member, Ad Hoc Art Installation Task Force, PGE, UT Austin, 2022–present  
Member, Center Outreach Committee, CSEE, UT Austin, 2021–present  
Member, EnergyNet Panel, PGE, UT Austin, 2021, 2022  
Member, Computers Committee, PGE, UT Austin, 2021–present  
Member, Ad Hoc Committee on Sustainability Minor, PGE, UT Austin, 2021  
Member, Graduate Studies Committee, PGE, UT Austin, 2020-2021  
Member, Faculty Recruitment Committee, PGE, UT Austin, 2020-2021  
Chair, Session on Unconventional Resources, Center for Petroleum and Geosystems Engineering Annual Showcase, UT Austin, 2019  
Member, Petroleum Science and Technology Institute for Texas High School Teachers, Department of Petroleum and Geosystems Engineering, UT Austin, 2019–present  
Student Paper Contest Judge, Society of Petroleum Engineers UT Austin Chapter, UT Austin, 2019–present

### Cockrell School-

Member, CSE AI/Data Analytics Cluster Hire Proposals writing team, Cockrell School of Engineering, UT Austin, February 2023, January 2024  
Graduate Student Career Seminar on Interviewing for Faculty Positions, Cockrell School Graduate Engineering Council, UT Austin, February 2023, January 2024  
Member, Graduate Admissions Committee, Material Sciences & Engineering, UT Austin, 2022–present  
Session leader, My Introduction To Engineering (MITE) Summer Enrichment Camp, Equal Opportunity in Engineering Program, UT Austin, 2022, 2023

### University-

Steering Committee member, Faculty Women’s Organization (FWO), UT Austin, 2023–present  
Session leader, My Introduction To Engineering (MITE) Summer Enrichment Camp, Equal Opportunity in Engineering Program, UT Austin, 2023  
Panelist, Society for Advancing Gender Equity in STEM (SAGES), UT Austin, April 2023  
Panelist, The Future of Sustainability in Energy, Switch Energy Alliance, UT Austin, 2022  
Panel Moderator, The Future of Sustainability in Energy, Switch Energy Alliance, UT Austin, 2020  
Speaker and Panelist (various topics), UT Energy Week, UT Austin, 2020–present  
Graduate and Industry Networking Poster Judge, Graduate Engineering Council, UT Austin, 2019–present  
UT Energy Week Poster Judge, UT Energy Club, UT Austin, 2019–present  
Careers Opportunities On Location Week Lecture, UT Austin, 2019

## PROFESSIONAL SOCIETY AND GOVERNMENTAL COMMITTEES

### Service to Professional Society

Technical Advisor, Interface Fluidics, 2017–2019

### Journal Reviewer

Environmental Science and Technology; Scientific Reports; Lab on a Chip; Physical Review Fluids; ACS Omega; Energy and Fuels; Transport in Porous Media; Fuel; Water Resources Research; Colloid and Interface Science Communications; Journal of Colloid and Interface Science; Applied Clay Science; Journal of Petroleum Science and Engineering; Natural Resources Research; Greenhouse Gases: Science and Technology; IEEE Transactions on Geoscience and Remote Sensing; Journal of Natural Gas Science and Engineering; Applied Sciences; Processes; Applied Optics; Catalysts; SPE Journal; International Journal of Greenhouse Gas Control; AIChE Journal; Computational Geosciences; Advanced Functional Materials.

### Research Proposal Reviewer

ORNL Ralph E. Powe Junior Faculty Enhancement Award, 2024

NSF Clean Energy Technology RAISE, 2024

NSF ECO-CBET, 2023

DOE Office of Energy Efficiency and Renewable Energy (EERE), 2023

DOE Office of Science EPSCoR, 2023

NSF GEO Hydrological Sciences, 2023

NSF GRFP, 2020, 2021, 2022, 2023

NSF CBET Interfacial Engineering, 2021

ACS Petroleum Research Fund, 2019, 2021, 2022, 2024

UT Austin Energy Institute, 2019

## COMMUNITY ACTIVITIES

### Conference/Workshop Chair/Co-Chair/Other

Session convener, Session H105: Pore-Scale Physics: Advances in Experiments, Modeling, and Theory, AGU Fall Meeting, 2024

Organizer, Farm to 40 Acres Day of Learning, Stanford Alumni Club, 2024

Short Course Instructor, InterPore, 2024

OSPA poster judge, AGU Fall Meeting, 2023

Member, Awards Committee, EAGE, 2023–present

President, Stanford Alumni Club of Austin, Austin, TX, 2022–2023

Member, Short Courses Committee, InterPore, 2021–present

Scientific Committee Member, Microfluidics and Energy Symposium, 2020–2021

Panelist, Women STEM Leadership in Academia, Career Strategies for Women in STEM Seminar Series, City College of New York, 2021

Mentor, Department of Energy Resources Engineering, Stanford University, 2020–2022; Department of Energy Science & Engineering, Stanford University, 2022–present

Convener and Chair, Session H136 Understanding Pore-Scale Mechanisms of Fluid Flow in Porous Media: Modeling and Experimental Approaches, AGU Fall Meeting, 2019

Clean Energy, Education, and Empowerment (C3E) Symposium Organizing Committee, Clean Energy Ministerial, US Department of Energy, 2017–2018

Global Energy Forum Organizing Committee, Precourt Institute for Energy, Stanford University, 2017 – 2018

Student Energy Competitions Task Force, Precourt Institute for Energy, Stanford University, 2017 – 2018

President, Stanford Energy Club, Stanford University, 2017 – 2018

Department Seminar Committee, Energy Resources Engineering, Stanford University, 2017 – 2018

Undergraduate Mentor Program Chair, Energy Resources Engineering, Stanford University, 2017 – 2018

Faculty Search Committee, Energy Resources Engineering, Stanford University, 2016 – 2017

Oil and Gas Group Leader, Stanford Energy Club, Stanford University, 2016 – 2017

Undergraduate and Graduate student mentor, Stanford University, 2015 – 2018

President, Officer, Society of Petroleum Engineers, Stanford University Chapter, 2015 – 2017

Founder and President, Society of Petroleum Engineers, University of Toronto Chapter, 2013 – 2014

Director of Seminars, Sustainable Engineers Association, 2010 – 2013

Chair, Mentor, Engineering Science Freshman Mentorship Program, 2009 – 2012

President, Project Director Tetra Society, University of Toronto Chapter, 2009 – 2012

## PUBLICATIONS

### A. Refereed Archival Journal Papers

[Google Scholar](#) Citations: 740; h-index: 11; i10-index: 11

\* Names of graduate students advised directly by Wen Song are *italicized*. Name of Wen Song's Ph.D. advisor is **bolded**.

#### *In Rank*

- J1 *Davletshin, A.* and Song, W. *Operando* scanning electron microscopy platform for *in situ* imaging of fluid evolution in nanoporous shale. *Lab on a Chip*, 24, 2920–2926, 2024. [doi.org/10.1039/D3LC01066J](https://doi.org/10.1039/D3LC01066J).  
A Lab on a Chip HOT Article.  
Lab on a Chip Emerging Investigator Series.  
Invited by editor to be featured as the issue cover.
- J2 *Fukuyama, D.*, Daigle, H., and Song, W. Capillarity-driven hydrate film formation on subsea carbon storage. *Transport in Porous Media*, 151 (4), 743–752, 2024. [doi.org/10.1007/s11242-024-02062-3](https://doi.org/10.1007/s11242-024-02062-3).
- J3 *Gerardo, S.*, Matthews, K., Warner, J., and Song, W. The Role of Nanoscale Crystallinity on REEs recovery from Coal Fly Ash. *Environmental Science & Technology Letters*, 10, 10, 943–948, 2023. [doi.org/10.1021/acs.estlett.3c00383](https://doi.org/10.1021/acs.estlett.3c00383).
- J4 *Xia, S.*, *Davletshin, A.* and Song, W. Enhanced oil recovery through microbially-induced calcium carbonate precipitation. *Energy & Fuels*, 37, 19, 14666–14673, 2023. [doi.org/10.1021/acs.energyfuels.3c02027](https://doi.org/10.1021/acs.energyfuels.3c02027).  
Invited by editor to be featured as the issue cover.
- J5 *Fukuyama, D.*, Daigle, H., Nole, M., and Song, W. Onset of convection from hydrate formation and salt exclusion in marine sands. *Earth and Planetary Science Letters*, 605, 118039, 2023. [doi.org/10.1016/j.epsl.2023.118039](https://doi.org/10.1016/j.epsl.2023.118039).
- J6 Datta, S., Battiato, I., Fernø, M., Juanes, R., Parsa, S., Prigiobbe, V., Santanach-Carreras, E., Song, W., Biswal, S., Sinton, D. Lab on a Chip for a Low-Carbon Future. *Lab on a Chip*, 2023. [doi.org/10.1039/D2LC00020B](https://doi.org/10.1039/D2LC00020B).  
A Lab on a Chip HOT Article.
- J7 *Hatchell, D.*, Song, W., and Daigle, H. Effect of interparticle forces on the stability and droplet diameter of Pickering emulsions stabilized by PEG-coated silica nanoparticles. *Journal of Colloid & Interface Science*, 626, 824–835, 2022. [doi.org/10.1016/j.jcis.2022.07.004](https://doi.org/10.1016/j.jcis.2022.07.004).
- J8 *Gerardo, S.*, *Davletshin, A.*, Loewy, S., and Song, W. From Ashes to Riches: Microscale Phenomena Controlling Rare Earths Recovery from Coal Fly Ash. *Environmental Science & Technology*, 56, 22, 16200–16208, 2022. [doi.org/10.1021/acs.est.2c04201](https://doi.org/10.1021/acs.est.2c04201).  
Invited by editor to be featured as the issue cover.
- J9 *Davletshin, A.*, Underwood, T., and Song, W. A Bidirectional Soft Diode for Artificial Systems. *Advanced Functional Materials*, 202200658A, 2022. [doi.org/10.1002/adfm.202200658](https://doi.org/10.1002/adfm.202200658).
- J10 *Hatchell, D.*, Song, W., and Daigle, H. Salinity effects on the dynamic stability of Pickering emulsions. *Journal of Colloid & Interface Science*, 608, 2321–2329, 2021. [doi.org/10.1016/j.jcis.2021.10.154](https://doi.org/10.1016/j.jcis.2021.10.154).
- J11 *Davletshin, A.*, Ko, T., Milliken, K., Perival, P., Wang, C., and Song, W. Detection of framboidal pyrite size distributions using convolutional neural networks. *Marine and Petroleum Geology*, 132 (105159), 2021. [doi.org/10.1016/j.marpetgeo.2021.105159](https://doi.org/10.1016/j.marpetgeo.2021.105159).
- J12 Daigle, H., Cook, A., Fang, Y., Bihani, A., Song, W., and Flemings, P. Gas-driven tensile fracturing in shallow marine sediments. *Journal of Geophysical Research: Solid Earth*, 125 (12), 2020. [doi.org/10.1029/2020JB020835](https://doi.org/10.1029/2020JB020835).
- J13 Song, W., Ramesh, N.N., and **Kovscek, A.R.** Spontaneous Fingering between Miscible Fluids. *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, 584, 123943, 2020. [doi.org/10.1016/j.colsurfa.2019.123943](https://doi.org/10.1016/j.colsurfa.2019.123943).

- J14 Song, W. and **Kovscek, A.R.** Spontaneous Clay Pickering Emulsification. *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, 577, 158-166, 2019. [doi.org/10.1016/j.colsurfa.2019.05.030](https://doi.org/10.1016/j.colsurfa.2019.05.030).

***Prior to UT Austin***

- J15 Song, W., Ogunbanwo, F., Steinsbo, M., Ferno, M., and **Kovscek, A.R.** Mechanisms of Multiphase Reactive Flow using Biogenically Calcite-Functionalized Micromodels. *Lab on a Chip*, 18, 3881-3891, 2018. [doi.org/10.1039/C8LC00793D](https://doi.org/10.1039/C8LC00793D).

Invited by editor to be featured as the issue cover.

- J16 Harrison, A.L., Dipple, G.M., Song, W., Mayer, K.U., Power, I.M., and Sinton, D. Pore scale visualization of mineral dissolution-precipitation reactions in the vadose zone. *Chemical Geology*, 463, 1-11, 2017. [doi.org/10.1016/j.chemgeo.2017.05.003](https://doi.org/10.1016/j.chemgeo.2017.05.003).

- J17 Song, W. and **Kovscek, A.R.** Direct visualization of pore-scale fines migration and formation damage during low-salinity waterflooding. *Journal of Natural Gas Science and Engineering*, 34, 1276-1283, 2016. [doi.org/10.1016/j.jngse.2016.07.055](https://doi.org/10.1016/j.jngse.2016.07.055).

- J18 Song, W. and **Kovscek, A.R.** Functionalization of micromodels with kaolinite for investigation of low salinity oil-recovery processes. *Lab on a Chip*, 15 (16), 3314-3325, 2015. [doi.org/10.1039/C5LC00544B](https://doi.org/10.1039/C5LC00544B).

Invited by editor to be featured as the issue cover.

- J19 Song, W., de Haas, T.W., Fadaei, H., and Sinton, D. Chip-off-the-old-rock: the study of reservoir-relevant geological processes with real-rock micromodels. *Lab on a Chip*, 14 (22), 4382-4390, 2014. [doi.org/10.1039/C4LC00608A](https://doi.org/10.1039/C4LC00608A).

This article was highlighted in a Chemistry World article.

- J20 Song, W., Fadaei, H., and Sinton, D. Determination of dew point conditions for CO<sub>2</sub> with impurities using microfluidics. *Environmental Science and Technology*, 48 (6), 3567-3574, 2014. [doi.org/10.1021/es404618y](https://doi.org/10.1021/es404618y).

***Refereed Journal Publications Currently Under Review***

- J21 *Xia, S.* and Song, W. Direct microvisualization of spatial controls on microbially-induced carbonate precipitation in geologic media. *In Review*.
- J22 *Gerardo, S.* and Song, W. Lithium Recovery from Oil and Gas Produced Waters: Resource Quality and Siting Considerations. *In Review*.

**B. Refereed Conference Proceedings**

***In Rank***

- C1 *Davletshin, A.*, Ko, T., Milliken, K., Periwal, P., Wang, C., and Song, W. Object detection in SEM images using CNN: Geological application on size distribution of pyrites in Mudrocks. *Microscopy and Microanalysis*. 28 (S1), 2964-2965, 2022. [doi.org/10.1017/S1431927622011102](https://doi.org/10.1017/S1431927622011102).
- C2 *Hatchell, D.*, Song, W., and Daigle, H. Effect of Inter-Particle van der Waals Attraction on the Stability of Pickering Emulsions in Brine. *SPE ATCE 2021*. SPE-206112-MS. [doi.org/10.2118/206112-MS](https://doi.org/10.2118/206112-MS).
- C3 *Hagen, M.*, Benali, B., Føyen, T., Song, W., Fernø, M.A., and Brattekkås, B. Calcite-functionalized micromodels for pore-scale investigations of CO<sub>2</sub> storage security. *SCA Annual Meeting 2021*. SCA2021-U023. [doi.org/10.1051/e3sconf/202336601004](https://doi.org/10.1051/e3sconf/202336601004) [Online due to COVID-19]

## C. News Highlights

### *In Rank*

- N1 Cantrell, Mary. [Rare earth mining project at Round Top near Sierra Blanca could have significant implications for entire Big Bend region.](#) The Big Bend Sentinel. December 8, 2021.
- N2 Mendoza-Moyers, Diego and Bruess, Elena. [Decision looms on future of Spruce power plant, San Antonio's biggest source of power — and pollution.](#) San Antonio Express-News. December 24, 2021.

## ORAL PRESENTATIONS

### A. Invited

#### A.1. *External to UT Austin*

##### *In Rank*

- I1 Song, W. Micro/nanoscale reactive transport toward decarbonization. Gordon Research Conference on Flow and Transport in Permeable Media. Sunday River, ME, July 2024.
- I2 Song, W. Micro/nanoscale reactive transport toward decarbonization. U.S. Department of Energy, Fossil Energy and Carbon Management. Washington DC, July 2024. [virtual]
- I3 Song, W. Micro/nanoscale reactive transport toward decarbonization. DeGolyer & MacNaughton. Dallas, TX, May 2024.
- I4 Song, W. InterPore Mini-Symposium on Flow, transport and mechanics in fractured porous media. Qingdao, China, May 2024. [declined]
- I5 Song, W. Energy Transition. Panelist, Farm to 40 Acres Day of Learning, Stanford Alumni Club. Austin, TX, 2024
- I6 Song, W. Micro/nanoscale reactive transport toward decarbonization. Department of Earth and Planetary Sciences, Stanford University. Stanford, CA, April 2024.
- I7 Song, W. Micro/nanoscale reactive transport toward decarbonization. Department of Mechanical and Civil Engineering, CalTech. Pasadena, CA, April 2024.
- I8 Song, W. Micro/nanoscale reactive transport toward decarbonization. Department of Petroleum Engineering, Texas A&M. College Station, TX, April 2024.
- I9 Song, W. Micro/nanoscale reactive transport toward decarbonization. Department of Mechanical Engineering, MIT. Cambridge, MA, March 2024.
- I10 Song, W. Micro/nanoscale reactive transport toward decarbonization. Department of Civil and Environmental Engineering, Carnegie Mellon University. Pittsburgh, PA, March 2024.
- I11 Song, W. Hydrate film formation in subsea carbon storage. AGU Fall Meeting. San Francisco, CA, December 2023.
- I12 Song, W. Micro/nanoscale reactive transport toward decarbonization. Department of Energy Science and Engineering, Stanford University. Stanford, CA, Fall 2023.
- I13 Song, W. Subsea Carbon Storage as Hydrates. Canadian Chemical Engineering Conference. Calgary, Canada, October 2023. [*Keynote*]
- I14 Song, W. Microscale reactive transport toward decarbonization. Department of Civil and Environmental Engineering, Princeton University. Princeton, NJ, October 2023.
- I15 Song, W. Microscale reactive transport toward decarbonization. Department of Chemical Engineering, Rochester Institute of Technology. Rochester, NY, October 2023.
- I16 Song, W. Microscale reactive transport toward decarbonization. Department of Atmospheric, Oceanic, and Earth Sciences, George Mason University. Fairfax, VA, April 2023.
- I17 Song, W. Micro/nanovisual study of fluid-mineral interactions toward enabling energy decarbonization. Geosciences Group, Lawrence Berkeley National Laboratory. Berkeley, CA, February 2023.



- I18 Song, W. Alumni talk. Division of Engineering Science, University of Toronto. Toronto, Canada, February 2023.
- I19 Song, W. Micro/nanovisual study of fluid-mineral interactions toward enabling energy decarbonization. Saudi Aramco. Virtual, January 2023.
- I20 Song, W. Alumni Talk. Department of Energy Science and Engineering, Stanford University. Stanford, CA, November 2022.
- I21 Song, W. Microscale reactive transport toward decarbonization. Department of Earth and Environmental Engineering, Columbia University. New York City, NY, November 2022.
- I22 Song, W. Reactive transport in nanoporous geomaterials. Gordon Research Conference on Liquid Phase Electron Microscopy. Ventura, CA, October 2022.
- I23 Song, W. Global Academic SuperSession, Interface Fluidics. Edmonton, Canada, September 2022. [virtual]
- I24 Song, W. Lithium in domestic brines: challenges and opportunities. Lithium RD&D Virtual Center, U.S. Department of Energy. July 2022. [virtual]
- I25 Song, W. Pore-Level Insights on CO<sub>2</sub> Storage. Department of Petroleum Engineering, Louisiana State University. Baton Rouge, LA, April 2022. [virtual]
- I26 Song, W. Geochemical Microfluidics toward a Low-Carbon Future. Interface Fluidics. Edmonton, Canada, April 2022. [virtual]
- I27 Song, W. Rare earth elements recovery from coal fly ash. ACS Spring Meeting. San Diego, CA, March 2022. [virtual]
- I28 Song, W. Critical MInerals: Micro/nanovisualization of recovery mechanisms. Tesla. Austin, TX. March 2022.
- I29 Song, W. On the Fluid-Solid Evolution of Nanoporous Materials: Mechanistic Delineation of Artificial Shale Maturation. Aramco Americas. Virtual, January 2022. [virtual]
- I30 Song, W. Direct Conversion of Li-Ions to Li-Metal from Domestic Brines or Produced Water through Electromagnetically-Controlled Dendritic Electrodeposition. Lithium RD&D Virtual Center, U.S. Department of Energy. December 2021. [virtual]
- I31 Song, W. Minerals Recovery from Waste Streams. EnergyX. Austin, TX, November 2021.
- I32 Song, W. Targeted Solvent Delivery for Enhanced Oil Recovery. ACS Fall Meeting. Philadelphia, PA, August 2021. [virtual]
- I33 Song, W. Geochemistry in Porous Energy Materials. International Microfluidics and Energy Symposium. April 2021. [*Keynote*, Online due to COVID-19]
- I34 Song, W. Geochemical Microfluidics for Energy and Environmental Sustainability. Department of Mechanical Engineering, City College of New York. March 2021. [Online due to COVID-19]
- I35 Song, W. Leveraging the Power of Small towards Energy Resources Recovery. Department of Petroleum Engineering, University of Wyoming. Laramie, WY, November 2020. [Online due to COVID-19]
- I36 Song, W. Alumni Panel. Department of Energy Resources Engineering, Stanford University. Stanford, CA, October 2020. [Panelist, Online due to COVID-19]
- I37 Song, W. Transitioning from Graduate School to Academia: Perspectives from a Recent Graduate. Stanford University Chapter of the Society of Petroleum Engineers, Department of Energy Resources Engineering, Stanford University. Stanford, CA, October 2020. [Online due to COVID-19]
- I38 Song, W. Spontaneous Emulsification of Crude Oils during Low Salinity Waterflooding. ACS Colloids and Surface Science Symposium. Houston, TX, June 2020. [*Keynote lecture*] [Online due to COVID-19]
- I39 Song, W. Targeted Solvent Enhanced Oil Recovery. ACS Spring Meeting. Philadelphia, PA, March 2020. [Canceled due to COVID-19]

- I40 Shell. Houston, TX, February 2020.
- I41 Song, W. On the dynamics of clathrate-rich sediments: compositional buffering of local phase behavior. Department of Geophysics, Stanford University. Stanford, CA, January 2020.
- I42 Song, W. Pore-Scale Controls of Reactive Transport in Carbonate Porous Media. AGU Fall Meeting. San Francisco, CA, December 2019.
- I43 Song, W. Mechanistic Delineation of Reactive Transport in Carbonate Porous Media and its Impact on CO<sub>2</sub> Storage Security. Society of Engineering Science Annual Technical Meeting. St. Louis, MO, October 2019.
- I44 Song, W. Mechanisms of Subsurface Resources Management. Physics of Microfluidics Symposium. Austin, TX, June 2019.
- I45 Song, W. Pore-Scale Observations into CO<sub>2</sub> Storage Security. Gordon Research Seminar: Carbon Capture, Utilization and Storage. Les Diablerets, Switzerland, May 2019.

*Prior to UT Austin*

- I46 Song, W. Microscale Transport for Improving Petroleum Recovery. Upstream Research Company, ExxonMobil, Spring, TX, April 2018.
- I47 Song, W. Pore-Scale Transport for Hydrocarbon Recovery. Hildebrand Department of Petroleum and Geosystems Engineering, University of Texas at Austin, Austin, TX, April 2018.
- I48 Song, W. Microfluidics for Subsurface Energy and Environmental Resources. Department of Mechanical and Industrial Engineering, University of Toronto, Toronto, Canada, March 2018.
- I49 Song, W. Micro/Nanoengineering for Subsurface Energy and Environmental Resources. Department of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge, MA, February 2018.
- I50 Song, W. Microscale Investigation of Fluid-Fluid and Fluid-Mineral Interactions Dictating Transport through Porous Media. Department of Civil and Environmental Engineering, Massachusetts Institute of Technology, Cambridge, MA, November 2017.
- I51 Song, W., **Kovscek, A.R.** Wettability in Reactive Transport through Carbonates and Implications for CO<sub>2</sub> Storage Security. Global Climate and Energy Project Student Energy Lectures, Stanford University, Stanford, CA, July 2017.
- I52 Song, W., **Kovscek, A.R.** Wettability in Transport through Carbonates. Stanford Center for Carbon Storage Annual Meeting, Stanford University, Stanford, CA, May 2017.
- I53 Song, W., **Kovscek, A.R.** Micro- and Nano-Fabricated Visualization Platforms for studying Hydrocarbon Recovery and CO<sub>2</sub> storage. IEEE SFBA Nanotechnology Council's 13th Annual Symposium, Milpitas, CA, May 2017.
- I54 Direct Visualization of Pore-Scale Phenomena related to Multiphase Reaction and Transport through Porous Media. Department of Mechanical and Industrial Engineering, University of Toronto, Toronto, Canada, September 2016.
- I55 Song, W., **Kovscek, A.R.** Wettability in Reactive Transport through Carbonates. Gordon Research Seminar: Flow and Transport in Permeable Media. Girona, Spain, July 2016.
- I56 Song, W., **Kovscek, A.R.** Direct Visualization of Pore-Scale Fines Migration and Formation Damage during Low-Salinity Waterflooding. Center for Integrated Petroleum Research, University of Bergen, Bergen, Norway, June 2016.
- I57 Song, **W. Kovscek, A.R.** Pore-Scale Visualization of Clay Particle Release in response to Changes in Brine Composition. Pore Scale Seminar, Department of Energy Resources Engineering, Stanford University, Stanford, CA, April 2015.

## ***A.2. Internal to UT Austin***

### ***In Rank***

- I58 Song, W. Micro/nanoscale reactive transport toward decarbonization. Department of Petroleum and Geosystems Engineering, UT Austin. Austin, TX, February 2024.
- I59 Song, W. Micro/nanoscale reactive transport toward decarbonization. Polymathic Scholars Honors Program, College of Natural Sciences, UT Austin, December 2023
- I60 Song, W. Micro/nanoscale reactive transport toward decarbonization. Center for Nonlinear Dynamics, UT Austin, November 2023
- I61 Song, W. Interviewing for Academic Positions. Graduate Student Career Seminar, Cockrell School Graduate Engineering Council, UT Austin, February 2023
- I62 Song, W. Reactive transport processes controlling energy decarbonization. Symposium on Energy Transition, SPE. Austin, TX, January 2023. [poster]
- I63 Song, W. Material resources toward a decarbonized energy future. PGE External Advisory Committee, UT Austin. Austin, TX, October 2022.
- I64 Song, W. Enabling the Sustainable Energy Transition: Economic Recovery of Rare Earth Elements. UT Energy Week, UT Austin. Austin, TX, March 2022.
- I65 Song, W. Supplying the minerals for a low-carbon energy future. UT Energy Week, UT Austin. Austin, TX, March 2022. [Panel]
- I66 Song, W. Reservoir Engineering Approaches toward the Energy Transition. Center for Subsurface Energy and the Environment, UT Austin. Austin, TX, January 2022.
- I67 Song, W. Enabling the Sustainable Energy Transition: Economic Recovery of Rare Earth Elements. UT Energy Institute, UT Austin. Austin, TX, October 2021.
- I68 Song, W. Recovery of Critical Materials. UT Energy Symposium, UT Austin. Austin, TX, March 2020. [Panelist]
- I69 Song, W. Leveraging the Power of Small towards Energy Resources Recovery. University of Texas Energy Symposium. Austin, TX, March 2020.
- I70 Song, W. Mineral Resources: Powering Sustainability. UT Austin Energy Institute Annual Showcase. Austin, TX, October 2019.
- I71 Song, W. Improving Reservoir Engineering with Microfluidics. UT Austin Center for Petroleum and Geosystems Engineering Annual Showcase. Austin, TX, August 2019.
- I72 Song, W. Control of Fluid-Rock Interactions at the Micro/Nano-Scales. Chemical Enhanced Oil Recovery Meeting, Department of Petroleum and Geosystems Engineering, University of Texas at Austin, Austin, TX, April 2019.
- I73 Song, W. In Search of Global Energy Solutions: What the Small-Scale can Offer. External Advisory Committee Meeting, Department of Petroleum and Geosystems Engineering, University of Texas at Austin, Austin, TX, April 2019.
- I74 Song, W. Functionalized Micromodels for Mechanistic Understanding of Petroleum Resources. Digital Rocks Petrophysics Inaugural Meeting, Department of Petroleum and Geosystems Engineering, University of Texas at Austin, Austin, TX, March 2019.
- I75 Song, W. Fluid-Fluid, Fluid-Mineral Interactions and Reactive Transport in Porous Media. Bureau of Economic Geology, University of Texas at Austin, Austin, TX, February 2019.

## B. Topical Conferences, Webinars, and Meetings

### *In Rank*

- T1 *Davletshin, A.* and Song, W. *Operando* visualization of shale thermochemical decomposition. *AGU Fall 2023 Meeting*. San Francisco, CA, December 2023.
- T2 *Gerardo, S.* and Song, W. Mechanisms Governing Rare Earth Elements Recovery from Coal Fly Ash: A Micro and Nanoscale Study. *AGU Fall 2023 Meeting*. San Francisco, CA, December 2023.
- T3 Song, W. Hydrate film formation in subsea carbon storage. *International Symposium on Wettability and Porous Media*. Laramie, WY, October 2023.
- T4 *Davletshin, A.* and Song, W. In-situ SEM thermo-chemical delineation of microscale organic matter heterogeneities during artificial shale maturation. *ACS Fall 2023 Meeting*. San Francisco, CA, August 2023.
- T5 *Fukuyama, D.*, Daigle, H., and Song, W. Hydrate film formation in subsea carbon storage. *Interpore 2023 Annual Meeting*. Edinburgh, UK, May 2023.
- T6 Song, W. Lithium recovery from brine. *DOE EERE AMMTO/IEDO Peer Review*. Washington DC, May 2023.
- T7 Song, W. Lithium recovery from brine. *DOE Critical Minerals and Materials Mini Symposium*. Washington DC, May 2023.
- T8 Song, W. A passive bidirectional soft valve. *Society of Engineering Science 2022 Annual Conference*. College Station, TX, October 2022.
- T9 Song, W. Carbon storage as a solid hydrate using geochemical microfluidics. *Society of Engineering Science 2022 Annual Conference*. College Station, TX, October 2022.
- T10 *Davletshin, A.* and Song, W. Novel *operando* SEM platform for *in situ* fluid-rock interaction visualization. *Gordon Research Conference on liquid cell electron microscopy*. Ventura, CA, October 2022.
- T11 Song, W. Dendritic electrodeposition from dilute solutions. *Gordon Research Conference: Electrochemical Interfaces in Energy Conversion and Storage*. Ventura, CA, August 2022.
- T12 Song, W. Hydrate film formation in subsea carbon storage. *Gordon Research Conference: Flow and Transport in Permeable Media*. Les Diablerets, Switzerland, July 2022.
- T13 *Strawson, J.*, Hatchell, D., and Song, W. Use of Nanoparticle-Stabilized Emulsions for Targeted Solvent Delivery. *AGU Fall Meeting*. New Orleans, LA, December 2021. [Online due to COVID-19]
- T14 *Fukuyama, D.*, Song, W., and Daigle, H. Mass transport processes at the pore scale during hydrate formation. *AGU Fall Meeting*. New Orleans, LA, December 2021. [Online due to COVID-19]
- T15 *Davletshin, A.* and Song, W. In-situ SEM Visualization of Organic-rich Shale Pyrolysis. *AGU Fall Meeting*. New Orleans, LA, December 2021. [Online due to COVID-19]
- T16 *Gerardo, S.*, *Davletshin, A.*, and Song, W. Implications of Microscale Morphology and Surface Reactivity in REEs Recovery from Coal Fly Ash. *AGU Fall Meeting*. New Orleans, LA, December 2021. [Online due to COVID-19]
- T17 *Hatchell, D.*, Song, W., and Daigle, H. Effect of Inter-Particle van der Waals Attraction on the Stability of Pickering Emulsions in Brine. *SPE ATCE 2021*. SPE-206112-MS. [Online due to COVID-19]
- T18 *Hagen, M.*, Benali, B., Føyen, T., Song, W., Fernø, M.A., and Brattekkås, B. Calcite-functionalized micromodels for pore-scale investigations of CO<sub>2</sub> storage security. *SCA Annual Meeting 2021*. SCA2021-U023. [Online due to COVID-19]
- T19 *Hatchell, D.*, Song, W., and Daigle, H. Effect of nanoparticle surface modification on the stability of CO<sub>2</sub>-in-brine Pickering foams. *ACS Fall Meeting 2021*. Atlanta, GA, August 2021. [Online due to COVID-19]

- T20 *Davletshin, A.*, Ko, L.T., Milliken, K., Periwal, P., Wang, C.C., and Song, W. Object Detection in SEM Images Using Convolutional Neural Networks: Application on Pyrite Framboid Size-Distribution in Fine-Grained Sediments. *AGU Fall Meeting*. San Francisco, CA, December 2020. [Online due to COVID-19]
- T21 *Fukuyama, D.*, Daigle, H., Nole, M., and Song, W. Induction of convective flow due to salt exclusion during hydrate formation in coarse-grained sediments. *AGU Fall Meeting*. San Francisco, CA, December 2020. [Online due to COVID-19]
- T22 *Hatchell, D.*, Griffith, C., Song, W., and Hugh Daigle, H. Effect of Nanoparticle Wettability on the Stability and Coalescence of Pickering Emulsions. *AGU Fall Meeting*. San Francisco, CA, December 2020. [Online due to COVID-19]
- T23 *Davletshin, A.*, Ko, L., Milliken, K., Periwal, P., and Song, W. Object Detection in SEM Images Using Convolutional Neural Networks: Application on Pyrite Framboid Size-Distribution in Fine-Grained Sediments. *AAPG 2020 Annual Convention and Exhibition*. Houston, TX, September 2020. [Online due to COVID-19]
- T24 *Gerardo, S.* and Song, W. Coal Fly Ash Characterization for Rare Earth Elements Recovery. *AAPG 2020 Annual Convention and Exhibition*. Houston, TX, September 2020. [Online due to COVID-19]
- Sheila was invited to serve as a Session Moderator for AAPG ACE 2021.
- T25 *Fukuyama, D.*, Nole, M., Song, W., and Daigle, H. Pairing the development of an open-source CO<sub>2</sub>-CH<sub>4</sub> hydrate reservoir simulator with phase behavior observations of real-rock micromodel experiments. *10th International Conference on Gas Hydrates*. Singapore, Singapore, June 2020.
- T26 *Davletshin, A.*, Kuo, T., and Song, W. SEM Image Automation using Machine Learning Techniques - Step 1: Building a Tool for Size-Distribution of Pyrite Framboids. Bureau of Economic Geology. Austin, TX, August 2019. [Talk]
- T27 *Gerardo, S.* and Song, W. Nanofluid Flooding: Mapping Recovery Mechanisms, Salinity, and Oil Film Distribution. CPGE Annual Showcase. Austin, TX, August 2019. [Poster]
- T28 *Obasi, C.E.* and Song, W. Development of Nanoparticle-Stabilized Smart Capsules for Targeted Solvent Enhanced Oil Recovery. CPGE Annual Showcase. Austin, TX, August 2019. [Poster]
- T29 *Davletshin, A.*, *Gerardo, S.*, *Obasi, C.E.*, and Song, W. Microfluidics for Subsurface Energy Management. Physics of Microfluidics Symposium. Austin, TX, August 2019. [Poster]
- T30 Song, W. Pore-Scale Observations into CO<sub>2</sub> Storage Security. *Gordon Research Conference: Carbon Capture, Utilization and Storage*. Les Diablerets, Switzerland, May 2019. [Poster]
- Prior to UT Austin***
- T31 Song, W. and **Kovscek, A.R.** Spontaneous Fractal Fingering between Miscible Fluids. *Gordon Research Conference: Flow and Transport in Permeable Media*. Newry, ME, July 2018. [Poster]
- T32 Song, W. and *Kovscek, A.R.* Spontaneous Fractal Fingering between Miscible Fluids. *2018 SUPRI-A Industrial Advisory Committee Meeting*. Stanford, CA, April 2018. [Talk]
- T33 Song, W. and *Kovscek, A.R.* Reactive Transport through Carbonates and Implications for CO<sub>2</sub> Storage Security. *Global Climate and Energy Project Research Symposium*. Stanford, CA, October 2017. [Talk]
- T34 Song, W., Ferno, M.A., and **Kovscek, A.R.** Pore-scale mechanics of reactive transport and phase change through calcite porous media. *Gordon Research Conference: Physics and Chemistry of Microfluidics*. Lucca, Italy, June 2017. [Poster]
- T35 Song, W., Ogunbanwo, F., Steinsbo, M., Ferno, M.A., Tchelepi, H., and **Kovscek, A.R.** Reactive Transport through Carbonates. *2017 SUPRI-A Industrial Advisory Committee Meeting*. Stanford, CA, April 2017. [Talk]
- T36 Song, W., Ferno, M.A., and **Kovscek, A.R.** Wettability in reactive transport through carbonates. *Gordon Research Conference: Flow and Transport in Permeable Media*. Girona, Spain, August 2016. [Poster]

- T37 Song, W. and **Kovscek, A.R.** Pore-scale visualization of carbonate dissolution mechanisms. *2016 SUPRI-A Industrial Advisory Committee Meeting*. Stanford, CA, April 2015. [Talk]
- T38 Song, W. and **Kovscek, A.R.** Direct visualization of pore-scale wettability alteration due to clays and impact on low salinity waterflooding. *2016 SUPRI-A Industrial Advisory Committee Meeting*. Stanford, CA, April 2016. [Talk]
- T39 Song, W. and **Kovscek, A.R.** Direct visualization of pore-scale wettability alteration due to clays. *12th International Symposium on Reservoir Wettability and its Effects on Oil Recovery*. Lawrence, KS, October 2015. [Talk]
- T40 Harrison, A.L., Dipple, G.M., Song, W., Power, I.M., Mayer, K.U., Beinlich, A., and Sinton, D. Pore Scale Visualization of Multiphase Reactions in the Unsaturated Zone. *Goldschmidt Abstracts*. Prague, Czech Republic, August 2015.
- T41 Song, W. and **Kovscek, A.R.** Pore-scale visualization of clay particle release in response to changes in brine composition. *2015 SUPRI-A Industrial Advisory Committee Meeting*. Stanford, CA. [Talk]  
Also presented at the *12th SEEES Annual Research Review* in Stanford, CA, April 2015.
- T42 Harrison, A.L., Dipple, G.M., Song, W., Power, I.M., Mayer, K.U., Beinlich, A., and Sinton, D. Pore scale visualization of multiphase reactions in the vadose zone. *The Geological Society of America Annual Meeting*. Vancouver, Canada, October 2014.
- T43 Harrison, A.L., Power, I.M., Dipple, G.M., Mayer, K.U., Wilson, S., Song, W., Sinton, D., and Su, D. Controls on carbon mineralization in mine wastes. *4th Annual Carbon Management Canada Conference*. Banff, Canada, June 2014.
- T44 Song, W., Fadaei, H., and Sinton, D. Reservoir engineering on a chip: enhanced oil recovery (EOR) studies using microfluidics. *4th World Petroleum Council Youth Forum*. Calgary, Canada, October 2013. [Talk]
- T45 Song, W., Fadaei, H., and Sinton, D. Micro/nanofluidics for hydraulic fracturing of shale gas. *Institute of Sustainable Energy Industrial Advisory Board Meeting*. Toronto, Canada, October 2013. [Poster]
- T46 Song, W., Fadaei, H., and Sinton, D. Dew point determination for impure CO<sub>2</sub> mixtures at high pressures and high temperatures using microfluidics. *3rd Annual Carbon Management Canada Conference*. Calgary, Canada. [Poster]  
Also presented at the *8th Annual Ontario-on-a-Chip conference* in Toronto, Canada, and the *4th MIE Research Symposium*. Toronto, Canada, June 2013.
- T47 Song, W. and Xia, K. Effect of notch thickness on the determination of fracture toughness using dynamic semi-circular bend technique. *University of Toronto Undergraduate Engineering Research Day*. Toronto, Canada, August 2009. [Talk]

## PATENTS

All patents/patent applications listed are based on research conducted while holding a faculty appointment at UT Austin.

### Patent Applications

- P1 Song, W. and *Davletshin, A.* *Operando* scanning electron microscopy platform. U.S. Provisional Patent (November 2023).
- P2 Song, W. and *Gerardo, S.* Metals extraction from ash. U.S. Provisional Patent, PCT/US2023/031024 (August 24, 2023).
- P3 Song, W. and Underwood, T. Multifunctional soft diode for artificial systems. U.S. Patent No. 18/194,068 (March 31, 2023).
- P4 Song, W., Underwood, T., and *Gerardo, S.* Electrodeposition of metals from liquid media. U.S. Patent No. 17/729,268 (April 2022).

## GRANTS AND CONTRACTS

13. Foam-Assisted Enhanced Hydrogen Recovery (EHR) (PI)
  - Source of Support: DOE ARPA-E
  - Award Number: DE-AR0001873
  - Total Award Period: 05/01/2024 - 04/30/2025
  - Total Award Amount: \$ 1,000,000
12. ML-ROCKS: Machine Learning Reaction Optimization of Carbonation KineticS (PI)
  - Source of Support: Sloan Foundation
  - Award Number: G-2024-22415
  - Total Award Period: 02/01/2024 - 01/31/2025
  - Total Award Amount: \$165,000
11. Hydrogen Storage in Salt Caverns in the Permian Basin: Seal Integrity Evaluation and Field Test (co-PI)
  - Source of Support: U.S. Department of Energy, Office of Fossil Energy and Carbon Management
  - Award Number: DE-FE0032349
  - Total Award Period: 10/01/2023 - 09/30/2025
  - Total Award Amount: \$1,854,363
10. Microbial Reactions during Underground Hydrogen Storage (co-PI)
  - Source of Support: UT Austin Energy Institute
  - Total Award Period: 05/01/2023 - 04/30/2024
  - Total Award Amount: \$ 100,000
9. CAREER: Rare Earth Elements Recovery from Nanoporous Ion-Adsorption Clays using Seawater (PI)
  - Source of Support: National Science Foundation
  - Award Number: 2145374
  - Total Award Period: 09/01/2022 - 08/31/2027
  - Total Award Amount: \$ 513,469
8. Assessment of Rare Earth Elements and Critical Minerals in Coal and Coal Ash in the U.S. Gulf Coast (co-PI)
  - Source of Support: U.S. Department of Energy, Office of Fossil Energy and Carbon Management
  - Award Number: DE-FE0032053
  - Total Award Period: 09/15/2021 - 09/14/2023
  - Total Award Amount: \$ 1,879,190
7. Direct Conversion of Li-Ions to Li-Metal from Domestic Brines or Produced Water through Electromagnetically-Controlled Dendritic Electrodeposition (PI)
  - Source of Support: U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy
  - Award Number: DE-EE0009440
  - Total Award Period: 06/01/2021 - 02/28/2025
  - Total Award Amount: \$ 625,038

6. On the Fluid-Solid Evolution of Nanoporous Materials: Mechanistic Delineation of Artificial Shale Maturation (PI)
  - Source of Support: American Chemical Society (ACS) Petroleum Research Fund (PRF) Doctoral New Investigator (DNI) Award
  - Award Number: PRF 61218-DNI9
  - Total Award Period: 09/01/2020 - 08/31/2022
  - Total Award Amount: \$ 110,000
5. Enabling the Sustainable Energy Transition: Economic Recovery of Rare Earth Elements (PI)
  - Source of Support: UT Austin Energy Institute
  - Total Award Period: 01/01/2020 - 05/31/2022
  - Total Award Amount: \$ 320,973
4. Assuring Long-term Storage of Captured CO<sub>2</sub>: Technical-Legal-Policy-Business Models (co-PI)
  - Source of Support: UT Austin Energy Institute
  - Total Award Period: 01/01/2020 - 05/31/2022
  - Total Award Amount: \$ 318,723
3. Engineered Water for Improved Oil Recovery from Fractured Reservoirs (co-PI)
  - Source of Support: U.S. Department of Energy, Office of Fossil Energy
  - Award Number: FE0031791
  - Total Award Period: 09/01/2019 - 08/31/2023
  - Total Award Amount: \$ 7,919,227
2. Targeted Enhanced Oil Recovery using Nanoparticle-Stabilized Solvent Capsules (PI)
  - Source of Support: Chemical Enhanced Oil Recovery Consortium
  - Total Award Period: 06/01/2019 - 05/31/2023
  - Total Award Amount: \$ 50,000
1. CO<sub>2</sub> foams stabilized only with surface-modified silica nanoparticles for enhanced oil recovery (co-PI)
  - Source of Support: ConTex
  - Total Award Period: 09/01/2019 - 08/31/2020
  - Total Award Amount: \$ 100,000



## COURSES TAUGHT

### Undergraduate Courses

- PGE 323K (Unique Number: 20020), Reservoir Engineering I: Primary Recovery (Fall 2023 semester)
- PGE 379 (Unique Number: 19990), Geothermal and Sustainable Energy Resources (Spring 2023 semester)
- PGE 323K (Unique Number: 20055), Reservoir Engineering I: Primary Recovery (Fall 2022 semester)
- PGE 323K (Unique Number: 18730), Reservoir Engineering I: Primary Recovery (Fall 2020 semester, online instruction due to COVID-19)  
Evaluated as *"Dr. Song is an amazing individual. She genuinely cares for her students, not only for our academic success, but also for our personal well-being. She's very approachable and is always available to address any type of concerns. Her thorough lectures are engaging, entertaining, and well-organized. She goes through everything step by step, so we can have a complete understanding of the material. She's very passionate about the subject and makes a tough course seem simple with her analogies, deep explanations, and her reiterating of the material. Being a student who is aspiring to become a professor, I consider her a role model."*
- PGE 323K (Unique Number: 18650), Reservoir Engineering I: Primary Recovery (Fall 2019 semester)  
Evaluated as *extraordinary professor!* and *Made me genuinely excited to come to class. Before I took your class I was unsure whether I was interested in having a career as a Reservoir Engineer but your class helped realize that I would enjoy it.*

### Graduate Courses and Combined Undergraduate/Graduate Courses

- PGE 383 (Unique Number: 19980/20060), Small-Scale Fluid Flow (Spring 2023 semester)
- PGE 383 (Unique Number: 19910), Small-Scale Fluid Flow (Spring 2022 semester)
- PGE 379/383 (Unique Number: 19844/19949), Geothermal and Sustainable Energy Resources (Spring 2022 semester)
- PGE 379/383 (Unique Number: 20034/20149), Geothermal and Sustainable Energy Resources (Spring 2021 semester, online instruction due to COVID-19)
- PGE 379/383 (Unique Number: 19208/19285), Small-Scale Fluid Flow (Spring 2020 semester, online instruction due to COVID-19)  
Evaluated as *"Lectures were very helpful and explained concepts starting from simple roots, and the number of examples and analogies was helpful in picturing the phenomena."* and *"I loved everything Dr. Song taught, she always knew how to answer our questions and how to teach a hard topic in simpler ways. I wish I could have taken more classes with her!"*
- PGE 383 (Unique Number: 19130), Small-Scale Fluid Flow (Spring 2019 semester)
- ENERGY 251, Thermodynamics of Equilibria (Fall 2018, Stanford University)

### Teaching Assistant

- ENERGY 301/ CEE 301/ MS&E 494: The Energy Seminar (Winter 2018, Stanford University)
- ENERGY/EE 293B: Fundamentals of Energy Processes (Winter 2017, Stanford University)
- ENERGY/EE 293B: Fundamentals of Energy Processes (Winter 2016, Stanford University)
- CHE 260: Thermodynamics and Heat Transfer (Fall 2013, University of Toronto)

## ACADEMIC SUPERVISION

### Ph.D. Supervisions Completed

2. Artur Davletshin, University of Texas at Austin (August 2023)  
Dissertation: *In-Situ Visualization of Fluid Dynamics in Nanoporous Materials*.  
Dissertation: *Understanding the stability of Pickering emulsions and foams by manipulating particle-particle and particle-interfacial forces with surface modification*.
1. David Erik Fukuyama, June 2022, Petroleum and Geosystems Engineering, University of Texas at Austin (co-advised with Hugh Daigle)  
Dissertation: *Gas Transport and Hydrate Formation in Porous Media*.  
Note: David is working at Sandia National Labs now.

### M.S. Supervisions Completed

2. Jack Strawson, University of Texas at Austin (September 2021–)  
Thesis: *Nanoparticle-stabilized targeted solvent delivery*.
1. Sheila Gerardo, June 2021, Petroleum and Geosystems Engineering, University of Texas at Austin  
Thesis: *Characterization and Recovery of Rare Earth Elements from Coal Fly Ash*.  
Note: Sheila continued onto Ph.D. studies in my group.

### Ph.D. Students in Progress

#### A. Students Entered into Ph.D. Candidacy

5. Shunxiang Xia, University of Texas at Austin (January 2020–)  
Dissertation: *Multiphase Fluid Dynamics in Carbonate Porous Materials*.

#### B. Students Not Yet Entered into Ph.D. Candidacy

4. Mustafa Mehrem, University of Texas at Austin (August 2023–)  
Dissertation: *Passivating effects during silicate dissolution*.
3. Aleksei Zhurkevich, University of Texas at Austin (June 2024–)
2. Yoonsu Na, University of Texas at Austin (June 2024–)
1. Yihan Li, University of Texas at Austin (August 2024–)

### M.S. Students in Progress

1. Feras Alsheikh, University of Texas at Austin (August 2023–)  
Thesis: *Ion exchange of rare earth elements on clay surfaces*.

### Postdoctoral Fellows

2. Artur Davletshin, University of Texas at Austin (October 2023–February 2024)
1. Zhenglong Li, University of Texas at Austin (March 2024–)

## Undergraduate Students Mentored

### *In Rank*

11. Reem Alsuwaiyan, University of Texas at Austin (June 2024–)
10. Moinak Joddar, University of Texas at Austin (January 2024–)
9. Sophia Rojo, University of Texas at Austin (Summer 2023)
8. John (Jay) Roberts, University of Texas at Austin (September 2022–May 2023)
7. Brayden Popica, University of Texas at Austin (January 2022–May 2023)
6. Daniel Moran, University of Texas at Austin (Summer 2022)  
Note: Daniel was a SURI student.
5. Jason Fan, University of Texas at Austin (Summer 2020)  
Topic: *Particle Image Velocimetry in Microfluidic Flows*.  
Note: Jason was a SURI student.
4. Hunter Harmuth, University of Texas at Austin (Summer 2020)  
Topic: *Automated Segmentation of Pore-Scale Micrographs*.
3. Jack Strawson, University of Texas at Austin (Summer 2020)  
Topic: *Nanoparticle-Stabilized Solvent Delivery for Enhanced Oil Recovery*.  
Note: Jack was a SURI student and has since continued onto an M.S./Ph.D. in my group.
2. Jaehun (Eric) Yoon, University of Texas at Austin (Summer 2019)  
Topic: *Direct Microvisual Chemical Analysis of Reactive Transport Dynamics*.
1. Xuefei (Sophie) Zhao, University of Texas at Austin (Spring 2019)  
Topic: *Self-Folding Origami Structures for Compression-Resistance*.

### *Prior to UT Austin*

- Emma Li, Stanford University (Summer 2018)  
Topic: *Fractal dimensions of fluid fingering in Hele-Shaw cells*.  
Note: Emma was a high school student.
- Natarajan (Raja) Ramesh, Stanford University (Summer 2017)  
Topic: *Nanofabrication of micromodels for fluid-mineral interactions visualization*.
- Donnique Sherman, Stanford University (Summer 2015)  
Topic: *Low salinity brine-clay interactions in kaolinite-functionalized micromodels*.  
Note: Donnique was a SURGE Diversity Program undergraduate research student.

## Committees Served

### *A. Ph.D. Committees*

13. Zexuan He, Petroleum and Geosystems Engineering, University of Texas at Austin, November 2023–present.  
Dissertation: *Water blocking effects resulting from hydraulic fracturing*.  
Advisor: David DiCarlo
12. Ibrahim Gomaa, Petroleum and Geosystems Engineering, University of Texas at Austin, November 2023–present.  
Dissertation: *CO<sub>2</sub>-rock static interactions in organic-rich mud rocks*.  
Advisor: Zoya Heidari
11. Veerabhadra S. Denduluri, Petroleum and Geosystems Engineering, University of Texas at Austin, September 2023–present.  
Dissertation: *Cementing materials for high temperature wells*.  
Advisor: Eric van Oort

10. Olin R. Carty, Petroleum and Geosystems Engineering, University of Texas at Austin, August 2023–present.  
Dissertation: *Gas, hydrates, and slope stability on temperate and Arctic margins*.  
Advisor: Hugh Daigle
9. Isa Silveira de Araujo, Petroleum and Geosystems Engineering, University of Texas at Austin, February 2023–present.  
Dissertation: *Quantifying the Impact of Geochemistry on Rock Physical Properties of Organic-Rich Mudrocks*.  
Advisor: Zoya Heidari
8. Matthew Coupin, Materials Science and Engineering, University of Texas at Austin, February 2023–present.  
Dissertation:  
Advisor: Jamie Warner
7. J. Brandon Adamo, Materials Science and Engineering, University of Texas at Austin, June 2022–present.  
Dissertation: *Delineating the Effects of Compositions and Electrolytes on the Degradation Mechanisms of High-energy-density Layered Oxide Cathodes*.  
Advisor: Arumugam Manthiram
6. Motaz Taha, Petroleum and Geosystems Engineering, University of Texas at Austin, 2023.  
Dissertation: *Advances in foam conformance control in carbonate reservoirs*.  
Advisor: Quoc Nguyen
5. Kevin C. Matthews, Materials Science and Engineering, University of Texas at Austin, January 2022–present  
Dissertation: *Interfacial Chemistry of Beyond Li Energy Storage Materials and Devices*.  
Advisor: Jamie Warner
4. Sabyasachi Dash, Petroleum and Geosystems Engineering, University of Texas at Austin, December 2021–present  
Dissertation: *Development of New Methods for the Assessment of Fluid Content and Mobility in Organic-Rich Mudrocks*.  
Advisor: Zoya Heidari
3. Yue Shi, Petroleum and Geosystems Engineering, University of Texas at Austin, 2022  
Dissertation: *Enhanced Oil Recovery from Heterogenous Oil-wet Tight Carbonate Reservoirs*.  
Advisor: Kishore K. Mohanty
2. Jianping Xu, Petroleum and Geosystems Engineering, University of Texas at Austin, 2021–present  
Dissertation: *Microfluidic Study of Pore-Scale Dissolution and Precipitation Patterns in Geological Carbon Storage*.  
Advisor: Matthew Balhoff
1. Lucas Mejia, Petroleum and Geosystems Engineering, University of Texas at Austin, 2021  
Dissertation: *Multiscale Visualization of Chemical Enhanced Oil Recovery*.  
Advisor: Matthew Balhoff

### ***B. M.S. Committees***

3. Mohammed A. Almansouri, Petroleum and Geosystems Engineering, University of Texas at Austin, 2021.  
Thesis: *Surfactant-Aided Wettability Alteration in Low-Temperature Low-Salinity Carbonate Reservoirs*  
Advisor: Kishore K. Mohanty
2. Motaz Taha, Petroleum and Geosystems Engineering, University of Texas at Austin, 2020.  
Thesis: *Experimental Evaluation of Foam for Mobility Control in WAG EOR in a Middle Eastern*

*Carbonate Reservoir*

Advisor: Quoc Nguyen

1. Faisal Alammari, Petroleum and Geosystems Engineering, University of Texas at Austin, 2020.  
Thesis: *Wettability Altering Surfactants for High-Temperature Tight Carbonate Reservoirs*  
Advisor: Kishore K. Mohanty

**STUDENT AWARDS**

16. Sheila Gerardo: Best Poster Award, Material Sciences Student Poster Contest, 2024
15. Sheila Gerardo: Best Poster Award, GAIN, 2024
14. Sophia Rojo: SURI Undergraduate Fellowship, 2023
13. Sheila Gerardo: Best Poster Award, DOE Clean Energy Education and Empowerment (C3E) Symposium, 2022
12. Daniel Moran: SURI Undergraduate Fellowship, 2022
11. Sheila Gerardo: TEX-E Fellow (Greentown/MIT), Class of 2022
10. David Fukuyama: Outstanding Student Presentation Award (OSPA), 2021 AGU Fall Meeting, 2022
9. Sheila Gerardo: Student Travel Award, 2021 AGU Fall Meeting, 2021
8. Artur Davletshin: Third Place, GTX 2021 Datathon, 2021
7. Sheila Gerardo: Best Poster Award, UT Energy Institute Student Research Competition, UT Austin, 2021
6. Jack Strawson: Hildebrand Excellence Graduate Fellowship, 2021–2022
5. Artur Davletshin: Best Poster Award, Graduate and Industry Networking Conference, UT Austin, 2021
4. Jack Strawson: SURI Undergraduate Fellowship, 2020
3. Jason Fan: SURI Undergraduate Fellowship, 2020
2. Shunxiang Xia: Hildebrand Excellence Graduate Fellowship, 2020
1. Sheila Gerardo: DOE Research Experience in Carbon Sequestration Tuition and Travel Grant, 2019