

WEN SONG

University of Texas at Austin
Hildebrand Department of Petroleum and Geosystems Engineering
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NATIONALITY: CANADIAN

EXPERIENCE

University of Texas at Austin

Assistant Professor of Petroleum and Geosystems Engineering (2019-present)
George H. Fancher Assistant Professor of Petroleum Engineering (2020-present)
Affiliated Faculty, Center for Subsurface Energy and the Environment (2019-present)
Affiliated Faculty, Texas Materials Institute (2020-present)

EDUCATION

2014 – 2019 **Stanford University**

Ph.D. in Energy Resources Engineering
Advisor: Professor Anthony R. Kavscek
Dissertation Topic: *"Fluid-Fluid, Fluid-Mineral Interactions and Reactive Transport in Porous Media"*.
Ph.D. Minor in Mechanical Engineering
Advisor: Professor John O. Dabiri (now at Caltech)

2012 – 2014 **University of Toronto**

M.S. in Mechanical Engineering
Advisor: Professor David A. Sinton
Thesis: *"Microfluidic Visualization of Phase and Flow Phenomena Related to Carbon Dioxide Transport and Usage"*.

2008 – 2012 **University of Toronto**

B.S. in Engineering Science, Energy Systems Engineering

Advisor: Professor Brent E. Sleep

Honors Thesis: *"Two Phase Dynamics in Porous Media with Applications to Carbon Sequestration"*.

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 CO₂ 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 so that students are equipped to meet our society's rising demands towards energy and environmental sustainability. I also 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

- 2020 UT Austin Nominee, Johnson & Johnson WiSTEM²D Award
- 2020 Fellow, George H. Fancher Professorship in Petroleum and Geosystems Engineering
- 2020 American Chemical Society Petroleum Research Fund New Investigator Award
- 2020 Protege of Larry W. Lake, The Academy of Medicine, Engineering, and Science of Texas
- 2018 – 2019 Gerald J. Lieberman Fellowship
- 2017 Gordon Research Conference (Microfluidics, Physics and Chemistry of) Best Poster Award
- 2016 Gordon Research Seminar (Flow and Transport in Permeable Media) Discussion Leader
- 2016 Petroleum Research School of Norway STEP Scholarship
- 2015 – 2018 Hormoz and Fariba Ameri Graduate Education Fellowship in Earth Sciences
- 2014 Society of Petroleum Engineers Calgary Section Scholarship
- 2013 4th World Petroleum Council Youth Forum Student Invitation Fellowship
- 2013 – 2014 Queen Elizabeth II Graduate Scholarship in Science and Technology
- 2013 MIE Research Symposium Best Poster Presentation Award
- 2013 Carbon Management Canada International Research Exchange Fellowship
- 2012 Gordon Cressy Award for Student Leadership
- 2009 Engineering Science Research Opportunities Program Fellowship

SERVICE

- 2021 – Member, Short Courses Committee, InterPore
- 2021 – Member, Computers Committee, Department of Petroleum and Geosystems Engineering, UT Austin
- 2021 Panelist, Women STEM Leadership in Academia, Career Strategies for Women in STEM Seminar Series, City College of New York
- 2021 Member, Ad Hoc Committee on Sustainability Minor, Department of Petroleum and Geosystems Engineering, UT Austin
- 2021 – Mentor, Department of Energy Resources Engineering, Stanford University
- 2020 Panel Moderator, The Future of Sustainability in Energy, Switch Energy Alliance
- 2020 – 2021 Member, Graduate Studies Committee, Department of Petroleum and Geosystems Engineering, UT Austin
- 2020 – 2021 Member, Faculty Recruitment Committee, Department of Petroleum and Geosystems Engineering, UT Austin
- 2020 Petroleum Science and Technology Institute for Texas High School Teachers, Department of Petroleum and Geosystems Engineering, UT Austin
- 2020 – 2021 Scientific Committee Member, Microfluidics and Energy Symposium
- 2020 Critical Minerals Panelist, UT Energy Week, UT Austin
- 2020 Graduate and Industry Networking Poster Judge, Graduate Engineering Council, UT Austin
- 2020 UT Energy Week Poster Judge, UT Energy Club, UT Austin
- 2019 Convener and Chair, Session H136 Understanding Pore-Scale Mechanisms of Fluid Flow in Porous Media: Modeling and Experimental Approaches, AGU Fall Meeting
- 2019 Chair, Session on Unconventional Resources, Center for Petroleum and Geosystems Engineering Annual Showcase, UT Austin
- 2019 Petroleum Science and Technology Institute for Texas High School Teachers, Department of Petroleum and Geosystems Engineering, UT Austin

- 2019 Student Paper Contest Judge, Society of Petroleum Engineers UT Austin Chapter, UT Austin
- 2019 Careers Opportunities On Location Week Lecture, UT Austin
- 2019 Graduate and Industry Networking Poster Judge, Graduate Engineering Council, UT Austin
- 2019 UT Energy Week Poster Judge, UT Energy Club, UT Austin
- 2017 – 2018 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
- 2016 – 2017 Faculty Search Committee, Energy Resources Engineering, Stanford University
- 2016 – 2017 Oil and Gas Group Leader, Stanford Energy Club, Stanford University
- 2015 – 2018 Undergraduate and Graduate student mentor, Stanford University
- 2015 – 2017 President, Officer, Society of Petroleum Engineers, Stanford University Chapter
- 2013 – 2014 Founder and President, Society of Petroleum Engineers, University of Toronto Chapter
- 2010 – 2013 Director of Seminars, Sustainable Engineers Association
- 2009 – 2012 Chair, Mentor, Engineering Science Freshman Mentorship Program
- 2009 – 2012 President, Project Director Tetra Society, University of Toronto Chapter

PROFESSIONAL ACTIVITIES

- 2019 – Present Reviewer and Panelist, National Science Foundation (NSF) Interfacial Engineering; Reviewer and Panelist, NSF Graduate Research Fellowship Program; Reviewer, American Chemical Society (ACS) Petroleum Research Fund (PRF)
- 2016 – Present Reviewer, Scientific Reports; Lab on a Chip; ACS Omega; Energy and Fuels; Transport in Porous Media; Fuel; Water Resources Research; Colloid and Interface Science Communications; 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
- 2013 – Present Member, Society of Engineering Science (SES); Society of Petroleum Engineers (SPE); American Chemical Society (ACS); American Association of Petroleum Geologists (AAPG); Geochemical Society; Academy of Association for the Advancement of Science (AAAS); Society of Women Engineers (SWE)
- 2017 – 2019 Advisor, Interface Fluidics Limited

GRANTS AND FUNDING

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: 03/01/2021 - 02/28/2023

Total Award Amount: \$ 625,000

Song Share Amount: \$ 186,592

On the Fluid-Solid Evolution of Nanoporous Materials (PI)

Source of Support: American Chemical Society (ACS) Petroleum Research Fund (PRF) Doctoral New Investigator (DNI) Award

Total Award Period: 09/01/2020 - 08/31/2022

Total Award Amount: \$ 110,000

Song Share Amount: \$ 110,000

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 - 12/31/2021

Total Award Amount: \$ 320,973

Song Share Amount: \$ 102,654

Assuring Long-term Storage of Captured CO₂: Technical-Legal-Policy-Business Models (co-PI; PI: Susan Hovorka)

Source of Support: UT Austin Energy Institute

Total Award Period: 01/01/2020 - 12/31/2021

Total Award Amount: \$ 318,723

Song Share Amount: \$ 126,760

Engineered Water for Improved Oil Recovery from Fractured Reservoirs (co-PI; PI: Kishore K. Mohanty)

Source of Support: U.S. Department of Energy, Office of Fossil Energy

Award Number: 165928

Total Award Period: 09/01/2019 - 08/31/2023

Total Award Amount: \$ 7,919,227

Song Share Amount: \$ 285,829

Targeted Enhanced Oil Recovery using Nanoparticle-Stabilized Solvent Capsules (PI)

Source of Support: Chemical Enhanced Oil Recovery Consortium

Total Award Period: 06/01/2019 - 05/31/2021

Total Award Amount: \$ 50,000

Song Share Amount: \$ 50,000

CO₂ foams stabilized only with surface-modified silica nanoparticles for enhanced oil recovery
(co-PI; PI: Hugh Daigle)

Source of Support: ConTex

Total Award Period: 09/01/2019 - 08/31/2020

Total Award Amount: \$ 100,000

Song Share Amount: \$ 25,000

INVITED TALKS

EXTERNAL TO UT AUSTIN

- [27] Department of Petroleum Engineering, Louisiana State University. Baton Rouge, LA, April 2022.
- [26] ACS Spring Meeting. San Diego, CA, March 2022.
- [25] ACS Fall Meeting. Philadelphia, PA, August 2021.
- [24] International Microfluidics and Energy Symposium. April 2021. [*Keynote*, Online due to COVID-19]
- [23] Department of Mechanical Engineering, City College of New York. March 2021. [Online due to COVID-19]
- [22] Department of Petroleum Engineering, University of Wyoming. Laramie, WY, November 2020. [Online due to COVID-19]
- [21] Department of Energy Resources Engineering, Stanford University. Stanford, CA, October 2020. [Panelist, Online due to COVID-19]
- [20] 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]
- [19] ACS Colloids and Surface Science Symposium. Houston, TX, June 2020. [*Keynote lecture*] [Online due to COVID-19]
- [18] ACS Spring Meeting. Philadelphia, PA, March 2020. [Canceled due to COVID-19]
- [17] Department of Geophysics, Stanford University. Stanford, CA, January 2020.
- [16] AGU Fall Meeting. San Francisco, CA, December 2019.
- [15] Society of Engineering Science Annual Technical Meeting. St. Louis, MO, October 2019.
- [14] Physics of Microfluidics Symposium. Austin, TX, June 2019.

- [13] Gordon Research Seminar: Carbon Capture, Utilization and Storage. Les Diablerets, Switzerland, May 2019.
- [12] Microscale Transport for Improving Petroleum Recovery. Upstream Research Company, ExxonMobil, Spring, TX, April 2018.
- [11] Pore-Scale Transport for Hydrocarbon Recovery. Hildebrand Department of Petroleum and Geosystems Engineering, University of Texas at Austin, Austin, TX, April 2018.
- [10] Microfluidics for Subsurface Energy and Environmental Resources. Department of Mechanical and Industrial Engineering, University of Toronto, Toronto, Canada, March 2018.
- [9] Micro/Nanoengineering for Subsurface Energy and Environmental Resources. Department of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge, MA, February 2018.
- [8] Pore-Scale Fluid-Mineral Interactions related to Multiphase Reactive Transport. Department of Civil and Environmental Engineering, Massachusetts Institute of Technology, Cambridge, MA, November 2017.
- [7] Wettability in Reactive Transport through Carbonates and Implications for CO₂ Storage Security. Global Climate and Energy Project Student Energy Lectures, Stanford University, Stanford, CA, July 2017.
- [6] Wettability in Transport through Carbonates. Stanford Center for Carbon Storage Annual Meeting, Stanford University, Stanford, CA, May 2017.
- [5] Micro- and Nano-Fabricated Visualization Platforms for studying Hydrocarbon Recovery and CO₂ storage. IEEE SFBA Nanotechnology Council's 13th Annual Symposium, Milpitas, CA, May 2017.
- [4] 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.
- [3] Wettability in Reactive Transport through Carbonates. Gordon Research Seminar: Flow and Transport in Permeable Media. Girona, Spain, July 2016.

- [2] 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.
- [1] 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.

INTERNAL TO UT AUSTIN

- [9] UT Energy Institute, UT Austin. Austin, TX, October 2021.
- [8] UT Energy Symposium, UT Austin. Austin, TX, March 2020. [Panelist]
- [7] University of Texas Energy Symposium. Austin, TX, March 2020.
- [6] UT Austin Energy Institute Annual Showcase. Austin, TX, October 2019.
- [5] UT Austin Center for Petroleum and Geosystems Engineering Annual Showcase. Austin, TX, August 2019.
- [4] Department of Petroleum and Geosystems Engineering, University of Texas at Austin, Austin, TX, April 2019.
- [3] External Advisory Committee Meeting, Department of Petroleum and Geosystems Engineering, University of Texas at Austin, Austin, TX, April 2019.
- [2] Digital Rocks Petrophysics Inaugural Meeting, Department of Petroleum and Geosystems Engineering, University of Texas at Austin, Austin, TX, March 2019.
- [1] Bureau of Economic Geology, University of Texas at Austin, Austin, TX, February 2019.

STUDENTS ADVISED

CURRENT STUDENTS

- 2019 - Present Artur Davletshin, Ph.D. Student, University of Texas at Austin
In-Situ Visualization of Fluid Dynamics in Nanoporous Materials.
- 2019 - Present Sheila Gerardo, M.S./Ph.D. Student, University of Texas at Austin
Geochemical Mechanisms Dictating the Recovery of Critical Materials and Rare Earth Elements.
- 2020 - Present Shunxiang Xia, Ph.D. Student, University of Texas at Austin
Multiphase Fluid Dynamics in Carbonate Porous Materials.
- 2021 - Present Qianjun Liu, Ph.D. Student, University of Texas at Austin
Li recovery from aqueous resources.
- 2019 - Present David Fukuyama, Ph.D. Student, University of Texas at Austin (with Hugh Daigle)
Hydrates Gas Exchange for Deepwater CO₂ Storage.
- 2019 - Present Malin Hagen, Ph.D. Student, University of Bergen, Norway (with Martin Ferno)
CO₂ Storage in Carbonate Reservoirs.
- 2021 - Present Jack Strawson, M.S/Ph.D. Student, University of Texas at Austin
Nanoparticle-stabilized targeted solvent delivery.

FORMER STUDENTS

- 2020 Jason Fan, B.S. SURI Student, University of Texas at Austin
Particle Image Velocimetry in Microfluidic Flows.
- 2020 Hunter Harmuth, B.S. Student, University of Texas at Austin
Automated Segmentation of Pore-Scale Micrographs.
- 2020 Jack Strawson, B.S. SURI Student, University of Texas at Austin
Nanoparticle-Stabilized Solvent Delivery for Enhanced Oil Recovery.
- 2019 Jaehun (Eric) Yoon, B.S. Student, University of Texas at Austin

Direct Microvisual Chemical Analysis of Reactive Transport Dynamics.

2019 Xuefei (Sophie) Zhao, B.S. Student, University of Texas at Austin

Self-Folding Origami Structures for Compression-Resistance.

2018 Emma Li (High School research student), Stanford University

Fractal dimensions of fluid fingering in Hele-Shaw cells.

2017 Raja Ramesh (Undergraduate research student), Stanford University

Nanofabrication of micromodels for fluid-mineral interactions visualization.

2015 Donnique Sherman (SURGE Diversity Program Undergraduate research student), School of Earth, Energy, and Environmental Sciences, Stanford University

Low salinity brine-clay interactions in kaolinite-functionalized micromodels.

AWARDS BY MY STUDENTS

2021 Sheila Gerardo: Student Travel Award, AGU

2021 Artur Davletshin: Third Place, GTX 2021 Datathon

2021 Sheila Gerardo: Best Poster Award, UT Energy Institute Student Research Competition, UT Austin

2021 Jack Strawson: Hildebrand Excellence Graduate Fellowship

2021 Artur Davletshin: Best Poster Award, Graduate and Industry Networking Conference, UT Austin

2020 Jack Strawson: SURI Undergraduate Fellowship

2020 Jason Fan: SURI Undergraduate Fellowship

2020 Shunxiang Xia: Hildebrand Excellence Graduate Fellowship

2019 Sheila Gerardo: DOE Research Experience in Carbon Sequestration Tuition and Travel Grant

PH.D. COMMITTEES SERVED

- 2021 Sabyasachi Dash, ., Advised by Z. Heidari, University of Texas at Austin
- 2021- Yue Shi, *Enhanced Oil Recovery from Heterogenous Oil-wet Tight Carbonate Reservoirs.*, Advised by K. K. Mohanty, University of Texas at Austin
- 2021- Jianping Xu, *Microfluidic Study of Pore-Scale Dissolution and Precipitation Patterns in Geological Carbon Storage.*, Advised by M. Balhoff, University of Texas at Austin
- 2020- David Fukuyama, *Linking experimental observations with numerical studies of multi-hydrate systems.* Advised by H. Daigle, University of Texas at Austin
- 2020- Lucas Mejia, *Multi-scale Visualization of Chemical EOR: Bridging the Core and Pore Scales.*, Advised by M. Balhoff, University of Texas at Austin

M.S. COMMITTEES SERVED

- 2021 Mohammed A. Almansouri, *Surfactant-Aided Wettability Alteration in Low-Temperature Low-Salinity Carbonate Reservoirs*, Advised by K. K. Mohanty, University of Texas at Austin
- 2020 Motaz Taha, *Experimental Evaluation of Foam for Mobility Control in WAG EOR in a Middle Eastern Carbonate Reservoir*, Advised by Q. Nguyen, University of Texas at Austin
- 2020 Faisal Alammari, *Wettability Altering Surfactants for High-Temperature Tight Carbonate Reservoirs*, Advised by K.K. Mohanty, University of Texas at Austin

COURSES TAUGHT

INSTRUCTOR

Winter 2021, PGE 383: Geothermal and Sustainable Energy Resources, University of Texas at Austin

[Online due to COVID-19]

Fall 2020, PGE 323K: Reservoir Engineering I, University of Texas at Austin

[Online 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. I can honestly say, she is one of the best professors I've had the pleasure of meeting in the department."

"I enjoyed this class and feel that Dr. Song was the factor that made it bearable. We had some disruptive students in class this semester, but she handled it very well and exhibited more patience than I could. For people with genuine concerns and who truly want to learn and improve, she is extremely kind, understanding, and goes above and beyond to ensure her students are learning and healthy. I felt the course was well organized, although it was extremely challenging at times. I appreciated that she reviewed previous days material in order to align us on the right ideas for the current days materials. She frequently asked us as a class what we wanted, any suggestions, feedback etc. and many of us had contradicting opinions, so given that fact, she did excellently in catering to all our different learning styles and trying to make the best of an imperfect situation. Dr. Song was extremely receptive to feedback and not only asked for it, but adapted her lessons based on the feedback she was given. She did a fantastic job teaching us this semester."

"Dr. Song was the best professor I have had during this virtual experience. She is the nicest and most caring of all professors. She made the virtual environment feel safe and nice for us to express our opinions and ask questions. She provided with feedback and helped us outside regular hours if needed."

Winter 2020, PGE 383: Small-Scale Fluid Flow, University of Texas at Austin

[Online 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!"

Fall 2019, PGE 323K: Reservoir Engineering I, University of Texas at Austin

Overall student rating: 4.5/5; 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."

Winter 2019, PGE 383: Small-Scale Fluid Flow, University of Texas at Austin

Overall student rating: 4.4/5

Fall 2019, ENERGY 251: Thermodynamics of Equilibria, Stanford University

Overall student rating: 4.8/5

TEACHING ASSISTANT

Winter 2018, ENERGY 301/ CEE 301/ MS&E 494: The Energy Seminar, Stanford University

Winter 2017, ENERGY/EE 293B: Fundamentals of Energy Processes, Stanford University

Winter 2016, ENERGY/EE 293B: Fundamentals of Energy Processes, Stanford University

Fall 2013, CHE 260: Thermodynamics and Heat Transfer, University of Toronto

PUBLICATIONS

JOURNAL PUBLICATIONS

- [11] Hatchell, D., Song, W., and Daigle, H. Salinity effects on the dynamic stability of Pickering emulsions. *Accepted to Journal of Colloid & Interface Science*, 2021.
- [10] Davletshin, A., Ko, T., Milliken, K., Periwal, 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.
- [9] 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.
- [8] 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.
- [7] Song, W. and Kovscek, A.R. Spontaneous Clay Pickering Emulsification. *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, 577, 158-166, 2019. doi:10.1016/j.colsurfa.2019.05.030.
- [6] 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:10.1039/C8LC00793D.

Invited by editor to be featured as the issue cover.

- [5] 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:10.1016/j.chemgeo.2017.05.003.
- [4] 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:/10.1016/j.jngse.2016.07.055.

- [3] 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:10.1039/C5LC00544B.

Invited by editor to be featured as the issue cover.

- [2] 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:10.1039/C4LC00608A.

This article was highlighted in a Chemistry World article.

- [1] Song, W., Fadaei, H., and Sinton, D. Determination of dew point conditions for CO₂ with impurities using microfluidics. *Environmental Science and Technology*, 48 (6), 3567-3574, 2014. doi:10.1021/es404618y.

SUBMITTED JOURNAL PUBLICATIONS AND ARTICLES IN PREPARATION

* Student names underlined.

- [4] Underwood, T.C., Davletshin, A., and Song, W. A Multifunctional Soft Diode for Artificial Systems. *In Review*.
- [3] Davletshin, A. and Song, W. In-situ observation of fluid phase evolution in nanoporous geomaterials. *In preparation*.
- [2] Davletshin, A., Davletshina, K., Akberova, A., Gerardo, S., and Song, W. Overcoming image data constraints using GAN of geological systems. *In preparation*.
- [1] Gerardo, S., Davletshin, A., DePaolo, D., and Song, W. Kinetics and reactive transport dictating minerals leaching from fly ash. *In preparation*.

PATENTS

- [1] Underwood, T.C. and Song, W. Electrodeposition of metals from liquid media. U.S. Provisional Patent 63/179,817 (April 2021).

CONFERENCE PROCEEDINGS: FULL LENGTH PAPERS

* Student names underlined.

- [2] 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]
- [1] Hagen, M., Benali, B., Føyen, T., Song, W., Fernø, M.A., and Brattekkås, B. Calcite-functionalized micromodels for pore-scale investigations of CO₂ storage security. *SCA Annual Meeting 2021*. SCA2021-U023. [Online due to COVID-19]

CONFERENCE PRESENTATIONS

* Student names underlined.

- [34] 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]
- [33] 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]
- [32] 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]
- [31] 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]
- [30] 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]
- [29] Hagen, M., Benali, B., Føyen, T., Song, W., Fernø, M.A., and Brattekkås, B. Calcite-functionalized micromodels for pore-scale investigations of CO₂

storage security. *SCA Annual Meeting 2021*. SCA2021-U023. [Online due to COVID-19]

- [28] Hatchell, D., Song, W., and Daigle, H. Effect of nanoparticle surface modification on the stability of CO₂-in-brine Pickering foams. *ACS Fall Meeting 2021*. Atlanta, GA, August 2021. [Online due to COVID-19]
- [27] 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]
- [26] 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]
- [25] Hatchell, D., Griffith, C., Wen 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]
- [24] 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.

- [23] Fukuyama, D., Nole, M., Song, W., and Daigle, H. Pairing the development of an open-source CO₂-CH₄ hydrate reservoir simulator with phase behavior observations of real-rock micromodel experiments. *10th International Conference on Gas Hydrates*. Singapore, Singapore, June 2020.
- [22] 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]
- [21] Gerardo, S. and Song, W. Nanofluid Flooding: Mapping Recovery Mechanisms,

Salinity, and Oil Film Distribution. CPGE Annual Showcase. Austin, TX, August 2019. [Poster]

- [20] 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]
- [19] Davletshin, A., Gerardo, S., Obasi, C.E., and Song, W. Microfluidics for Subsurface Energy Management. Physics of Microfluidics Symposium. Austin, TX, August 2019. [Poster]
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