Bo Ren
Professional Summary
July 4, 2021

Business address: The University of Texas at Austin
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Info: LinkedIn Profile I Google Scholar I BEG Profile I Hydrogen Research

Academic Background
Ph.D. Petroleum Engineering, The University of Texas at Austin, August 2017
Supervisor: Dr. Larry Lake; Co-supervisor: Dr. Steven Bryant
M.S. Petroleum Engineering, China University of Petroleum (East China), June 2012
B.S. Petroleum Engineering, China University of Petroleum (East China), June 2009, first-class

Areas of Expertise/Interest
A. Hydrogen storage and generation
B. Geological carbon sequestration
C. Gas enhanced oil recovery
D. Reservoir engineering
E. Reservoir numerical simulation
F. Reservoir surveillance
G. Unconventional resources
H. Data analytics and machine learning

Skills
Experience in project management using Gantt
Skilled with CMG, Eclipse, Intersect, Petrel, and OFM
Experience in parallel computation
Experience in reservoir geological modeling
Experience in Kinder Morgan CO_2 Flood Scoping Model
Well versed in programming using Python and MATLAB
Experience in RTA (rate transient analysis)

Professional Preparation
Professional Appointments

A. Research Associate, Improved Oil Recovery Engineer, Bureau of Economic Geology, The University of Texas at Austin (November 2019 – Present)

   Working on various oil/gas/hydrogen recovery projects in the State of Texas Advanced Resource Recovery (STARR) program at BEG. The topics include CO_2 enhanced oil recovery and storage, hydrogen, residual oil zones, waterflooding, and reservoir optimization and management. Much of my work is focused on understanding and controlling subsurface multiphase flow and reactive transport. I also develop and use full and reduced-physics models to predict flow. These flow models consider geologic constraints and include both physics- and data-driven processes.

B. Postdoctoral fellow, Reservoir Engineer, Hildebrand Department of Petroleum and Geosystems Engineering, Bureau of Economic Geology, The University of Texas at Austin (September 2017 – October 2019). Supervisors: Dr. Larry Lake, Dr. Ian Duncan.

   Optimizing CO_2 sweep based on geochemical and reservoir characterization of the residual oil zone of the Seminole oilfield; Conducting flow simulations of the residual oil zone (ROZ) generation and evolution using Eclipse/Intersect and Texas Advanced Computing Resources; Examining the effect of injection strategies on CO_2 sweep efficiency in the ROZ; Conducting

economic assessment of various CO_2 injection strategies (e.g., CO_2 foam, water alternating gas). Assisting in supervising undergraduate and master research assistants.

C. Geomodeler Intern, Bureau of Economic Geology, The University of Texas at Austin (May 2017 – August 2017)

Geostatistical modeling of the largest producing residual oil zone of the Seminole San Andres Unit; Adopted fuzzy logic to generate facies logs for 650 wells in the ROZ, yielding a comprehensive facies model; Generated multiple realizations of porosity and permeability fields using the Petrel tool and rock typing method.

D. Reservoir Engineering Intern, BP America (May 2014 – August 2014).

Developed a model to evaluate lifetime energy utilization and carbon emissions arising from petroleum recovery operations; Collaborated with business units to analyze the energy & CO_2 emissions intensities in 3 BP oilfields under different recovery processes; Explored and identified the potential energy efficiency improvements by evaluating reservoir conformance improvement techniques; Assessed energy efficiency improvement by bright-water injection in a BP Alaskan oilfield, indicated the potential $$ value of bring-water injection around 1.1 MM/yr/injector.

E. Graduate Research Assistant, Hildebrand Department of Petroleum and Geosystems Engineering, The University of Texas at Austin (September 2012 – May 2017).

Reservoir simulation of the effect of heterogeneous capillary pressure on the buoyant flow of CO_2 in saline aquifers; Developed a fast physics-proxy method of estimating local capillary trapping during CO_2 injection; Developed an analytical model to describe CO_2 migration, accumulation, and trapping; Revealed the interaction between permeability retardation and capillary trapping.

F. Graduate Research Assistant, China University of Petroleum (East China) (January 2010 – May 2012).

Reservoir monitoring during CO_2 miscible flooding; Analyzed injection & production data, reservoir pressure and core-flooding experimental results to assess CO_2/oil miscibility in a low-permeability reservoir; Evaluated different geophysical and geochemical techniques used in the field for tracking CO_2 migration in the reservoir; Optimized the reservoir monitoring program for CO_2 miscible flooding.

G. Reservoir Engineering Intern, Jilin Oilfield, PetroChina (July 2010 – August 2010).

Investigated and recommended the optimal well fluid sampling frequency and test parameters for monitoring the CO_2 miscible flooding, reducing the cost by more than 1/3; Evaluated the length of hydraulic fractures on CO_2-EOR performance using CMG-GEM, recommended the optimal length of hydraulic fractures for developing tight oil reservoirs during CO_2 injection.

H. Undergraduate Assistant, China University of Petroleum (East China) (November 2008 – August 2009).

Experimental and numerical study on the CO_2 near-miscible flooding in a low-permeability reservoir of Shengli oilfield; Performed slim-tube tests and core-flooding to determine both minimum miscibility pressure and displacement efficiency; Conducted history matching and tuned the EOS model to the results of both CO_2/oil phase behaviors and coreflooding tests.

I. Petroleum Engineering Co-op, Shengli Oilfield, Sinopec (July 2008 – August 2008).

Participated in the routine production operation of the oilfield; Analyzed and evaluated the water flooding performance of several oil reservoirs using the decline curve analysis.

Continuing Education Courses Taken

INTERSECT 2018 reservoir simulation fundamentals, The University of Texas at Austin, Austin, Texas, October 16-18, 2019.

Interdisciplinary carbon capture, utilization, and storage (CCUS) workshop, University of Houston, Houston, Texas, September 23-24, 2019.

The mechanics and nuance of public speaking, The University of Texas at Austin, Austin, Texas, March 28, 2019.

Whole value chain carbon capture, utilization and storage (CCUS) student week, Norwegian Research Council Research School and Colorado School of Mines, Golden, Colorado, October 15-19, 2018.

Committee Responsibilities and Professional Activities

Society of Petroleum Engineers (SPE)

Team Captain, Data Science and Engineering Analytics PetroBowl Question Writing, SPE North America Regional PetroBowl, 2021
Program Committee Member, SPE Annual Technical Conference and Exhibition, 2021-2023
Program Committee Member, SPE Unconventional Resource Technology Conference, 2021
Judge, SPE North America Regional PetroBowl, 2021
Associate Editor, SPE Reservoir Evaluation & Engineering, Gas EOR Discipline, 2019 – present,
Volunteer, PetroWiki Translation, 2019
Volunteer, PetroBowl Question Writer, SPE International PetroBowl, 2018
Committee Member, SPE Student Section Award Judging, 2018
Technical Editor, SPE Reservoir Evaluation & Engineering, 2017 - present
Technical Editor, SPE Journal, 2018 - present
Secretary, China University of Petroleum (East China) SPE Student Chapter, 2012

Reviewer

Peer reviewed journals (number of reviews): SPE Journal (15), SPE Reservoir Evaluation & Engineering (6), Journal of Petroleum Science and Engineering (26), International Journal of Greenhouse Gas Control (6), Fuel (4), Journal of Natural Gas Science and Engineering (6), Applied Energy (3), Energy and Fuel (2), International Journal of Oil, Gas, and Coal Technology (3), Journal of Porous Media (2), Petroleum (1), Journal of Hydrodynamics (1), Interpretation(2), Stochastic Environmental Research and Risk Assessment (4), International Journal of Heat and Mass Transfer (2), Journal of CO_2 Utilization(3), Journal of Unconventional Oil and Gas Resources (2), Energy Science & Engineering (1), Simulation-SAGE Journal (1), Journal of Cleaner Production (2), International Journal of Environmental Science and Technology (1). International Journal of Hydrogen Energy (1).

The University of Texas at Austin

Judge, 10th Annual Jackson School Student Research Symposium, 2021
Judge, Cockrell School Undergraduate Poster Exhibition on Engineering Research, 2017
Member, UT-Austin Intramural Council, 2015-2016
Volunteer, Explore UT- Cockrell School of Engineering, UT-Austin, 2015, 2017
Group Organizer, Speaker, UT Sciences Toastmasters Club, UT-Austin, 2015-2016

External Committees Participation

Associate Editor, Journal of Petroleum Science and Engineering, August 2020 – present

Awards and Honorary Societies

Regional Giovanni Paccaloni Young Professional Service Award, SPE, 2021
Career Development Publication Award, UT-Austin BEG, 2020-2021
Outstanding Technical Reviewer, SPE Journal, 2020
Outstanding Reviewer, International Journal of Greenhouse Gas Control, 2018
Outstanding Reviewer, Journal of Petroleum Science and Engineering, 2017
Shell Research Award, UT-Austin GAIN (Graduate and Industrial Network), 2015
3rd Prize for Research Excellence in Energy & Environment, UT-Austin Energy Week, 2015

Co-author of the highlighted paper included in the DOE-NETL Carbon Storage News Letter (June 2015). Paper title: "CO_2 Foam Flooding for Improved Oil Recovery: Reservoir Simulation Model and Influencing Factors", 2015
Co-author of the highlighted paper included in the DOE-NETL Carbon Storage News Letter (February 2015). Paper title: "CO_2 EOR and Storage in Jilin Oilfield China: Monitoring Program and Preliminary Results", 2015
Captain, Volleyball Team of UT Austin-CSSA (Chinese Students & Scholars Association), 2014-2015
Recipient, ConocoPhillips Fellowship, UT-Austin, 2012-2013
Recipient, Roberto Rocca Scholarship, China University of Petroleum (East China), 2010 - 2011
Recipient, Outstanding Postgraduate Award, China University of Petroleum (East China), 2009 - 2011
Recipient, National Scholarship, China University of Petroleum (East China), 2007-2008

Professional Societies
Society of Petroleum Engineers
American Geophysical Union

Publications
Patents
None

Articles (Peer reviewed)
Ren, B., Jensen, J., Duncan, I., Lake, Larry. Analysis and Importance of Vertical Permeability in a Carbonate Reservoir Undergoing CO_2 EOR. In preparation to be submitted to *SPE Journal*. 2021

Ren, B., Duncan, I.J., Male, F. Analysis of the Economics of Alternative Strategies for CO_2 EOR and Storage in Brownfield Residual Oil Zones. Submitted to *Interpretation*. 2021

Shuster, M., Bhattacharya, S., Duncan, I.J., Eichhubl, P., Hosseini, S., Javadpour, F., Kipper, J.P., Lin, N., Nicot, J.P., Ren, B. Hydrogen Infrastructure Expansion Requires Realistic Framework. *Oil & Gas Journal*, 2021

Duncan, I., Shuster, M., Lake, L.W., Ren, B. In-Situ Generation of Hydrogen (and Simultaneous CO2 Sequestration) from Oxidation of Hydrocarbon Reservoirs: Developing Key Research Questions. Ready to be submitted to *International Journal of Greenhouse Gas Control*, 2021

Wang, J.P., Zeng, L.B., Zhang, J., Zhang, R.H., Wang, K., Ren, B., Wang, Q.Q., Chen, X.G., Liu, T.T. Subsurface Fracture Characterization in a Folded Ultra-Deep Tight Sandstone Reservoir: A Case Study of KeShen Gas Field, Tarim Basin, China. Submitted to *Journal of Natural Gas Science and Engineering*, 2021

Ren, G.W., Ren, B., Li, S.Y., Zhang, C. Unlock the Potentials to Further Improve CO_2 Storage and Utilization with Supercritical CO_2 Emulsions When Applying CO_2-Philic Surfactants. *Sustainable Chemistry*. 2021:2, 127-148. https://doi.org/10.3390/suschem2010009

Ren, B., Duncan, I.J. Maximizing Oil Production from Water Alternating Gas (CO_2) Injection into Residual Oil Zones: The Impact of Oil Saturation and Heterogeneity. *Energy*. 2021, 119915. https://doi.org/10.1016/j.energy.2021.119915

Zhong, Z., Ren, B., Sun, A.Y., Wang, Y. A. Deep-Learning Based Approach for Reservoir Production Forecast Under Uncertainty. *SPE Journal*, 2021: 1-27. https://doi.org/10.2118/205000-PA

Feng, D., Bakhshian S., Wu, K.L., Song, Z.J., Ren, B., Li, J., Hosseini, S.A., Li, X.F Effects of wettability on phase behavior and interfacial tensions in nanopores. *Fuel.* 2020:290, 119983. https://doi.org/10.1016/j.fuel.2020.119983

Ren, B., Jeong, H. Buoyant and Countercurrent Flow of CO_2 with Capillary Dispersion. *Journal of Petroleum Science and Engineering*. 2020:195, 107922. https://doi.org/10.1016/j.petrol.2020.107922

Zhong, Z., Sun, A.Y., Wang, Y., Ren, B. Predicting Field Production Rates for Waterflooding Using a Machine Learning-Based Proxy Model. *Journal of Petroleum Science and Engineering*. 2020:194, 107574. https://doi.org/10.1016/j.petrol.2020.107574

Ren, B., Trevisan L. Characterization of Local Capillary Trap Clusters in Storage Aquifers. *Energy*. 2020:193, 116795. https://doi.org/10.1016/j.energy.2019.116795

Wang, Y., Zhang, L., Ren, S., Ren, B., Chen, B.L., Lu, J. Identification of Potential CO_2 Leakage Pathways and Mechanisms in Oil Reservoirs Using Fall Tree Analysis. *Greenhouse Gases: Science and Technology*. 2020:0, 1-16. https://doi.org/10.1002/ghg.1959

Ren, B., Bryant, S.L., Lake, L.W. Estimating Local Capillary Trap Volume Capacities using a Geologic Criterion. *International Journal of Greenhouse Gas Control*. 2019: 85, 46-57. https://doi.org/10.1016/j.ijggc.2019.03.025

Peng, S., Ren, B., Meng, M.M. Quantifying the Influence of Fractures for More-Accurate Laboratory Measurement of Shale Matrix Permeability Using a Modified Gas-Expansion Method. *SPE Reservoir Evaluation & Engineering – Formation Evaluation*. 2019, preprint. https://doi.org/10.2118/195570-PA

Ren, B., Duncan, I.J. Modeling Oil Saturation Evolution in Residual Oil Zones: Implications for CO_2 EOR and Sequestration. *Journal of Petroleum Science and Engineering*. 2019:177, 528-539. https://doi.org/10.1016/j.petrol.2019.02.072

Ren, B., Duncan, I.J. Reservoir Simulation of Carbon Storage Associated with CO_2 EOR in Residual Oil Zones, San Andres Formation of West Texas, Permian Basin, USA. *Energy*. 2019:167, 391-401. https://doi.org/10.1016/j.energy.2018.11.007

Ren, B. Local Capillary Trapping in Carbon Sequestration: Parametric Study and Implications for Leakage Assessment. *International Journal of Greenhouse Gas Control*. 2018:78, 135-147. https://doi.org/10.1016/j.ijggc.2018.08.001

Ren, B., Jeong, H. Influence of Injection Strategies on Local Capillary Trapping during Geological Carbon Sequestration in Saline Aquifers. *Journal of CO_2 Utilization*. 2018:27, 441-449. https://doi.org/10.1016/j.jcou.2018.08.021

Ren, B., Delaney, J.M., Lake, L.W., Bryant, S.L. Interplay Between Permeability Retardation and Capillary Trapping of Rising Carbon Dioxide in Storage Reservoirs. *SPE Journal*. 2018:23(5), 1866-1879. https://doi.org/10.2118/187356-PA

Ren, B., Ren, S.R., Zhang, L., Chen, G.L., Zhang, H. Monitoring on CO_2 Migration in a Tight Oil Reservoir during CCS-EOR in Jilin Oilfield China. *Energy*. 2016:98, 108-121. | Featured as the highly cited paper that received enough citations to place it in the top 1% of academic field of Engineering according to Thomson Reuters (Feb, 2017)

Cui, G.D., Ren, S.R., Zhang, L., Ren, B., Zhuang, Y., Li, X., Han, B., Zhang, P.F. Formation Water Evaporation Induced Salt Precipitation and Its Effect on Gas Production in High Temperature Natural Gas Reservoirs. *Petroleum Exploration and Development*. 2016:43(5), 815-824. http://dx.doi.org/10.1016/S1876-3804(16)30097-0

Cui, G.D., Zhang, L., Ren, B., Enechukwu, C., Liu, Y.M., Ren, S.R. Geothermal Exploitation from Depleted High Temperature Gas Reservoir via Recycling Supercritical CO_2: Heat Mining Rate and Salt Precipitation Effects. *Applied Energy*. 2016:183, 837-852. http://dx.doi.org/10.1016/j.apenergy.2016.09.029

Zhang, L., Cui, G.D., Zhang, Y., Ren, B., Ren, S.R., Wang, X.H. Influence of Pore Water on the Heat Mining Performance of Supercritical CO_2 Injected for Geothermal Development. *Journal of CO_2 Utilization*. 2016:16, 287-300. http://dx.doi.org/10.1016/j.jcou.2016.08.008

Zhang, L., Li, X., Ren, B., Cui, G.D., Zhang, Y., Ren, S.R., Chen, G.L., Zhang, H. CO_2 Storage Potential and Trapping Mechanisms in the H-59 Block of Jilin Oilfield China. *International Journal of Greenhouse Gas Control*. 2016:49, 267-280. doi:10.1016/j.ijggc.2016.03.013

Huang, F., Huang, H.D., Wang, Y.Q., Ren, J.F., Zhang, L., Ren, B., Hassan B., Ren S.R., Chen, G.L., Zhang, H. Assessment of Miscibility Effect for CO_2 Flooding EOR in a Low Permeability Reservoir. *Journal of Petroleum Science and Engineering*. 2016:145, 328-335. http://dx.doi.org/10.1016/j.petrol.2016.05.040

Ren, B., Zhang, L., Huang, H.D., Ren, S.R., Chen, G.L., Zhang, H. Performance Evaluation and Mechanisms Study of Near-miscible CO_2 Flooding in a Tight Oil Reservoir of JiLin Oilfield China. *Journal of Natural Gas Science and Engineering*. 2015:27(3), 1796-1805. doi:10.1016/j.jngse.2015.11.005

Li, D.X., Ren, B., Zhang, L., Ezekiel, J., Ren, S.R., Feng, Y.J. CO_2-sensitive Foams for Mobility Control and Channeling Blocking in Enhanced WAG Process. *Chemical Engineering Research and Design*. 2015:102, 234-243. doi:10.1016/j.cherd.2015.06.026

Zhang, Y., Wang, Y.T., Xue, F.F., Wang Y.Q., Ren, B., Zhang, L., Ren, S.R. CO_2 Foam Flooding for Improved Oil Recovery: Reservoir Simulation Model and Influencing Factors. *Journal of Petroleum Science and Engineering*. 2015:133, 838-850. | Featured in the US Department of Energy-National Energy Technology Laboratory (DOE-NETL) carbon storage newsletter (June, 2015)

Zhang, L., Ren, B., Huang, H.D., Li, Y.Z., Ren, S.R., Chen, G.L., Zhang, H. CO_2 EOR and Storage in JiLin Oilfield China: Monitoring Program and Preliminary Results. *Journal of Petroleum Science and Engineering*. 2015:125, 1-12. | Featured in the US Department of Energy-National Energy Technology Laboratory (DOE-NETL) carbon storage newsletter (Feb, 2015)

Zhang, L., Huang, H.D., Wang, Y.Q., Ren, B., Ren, S.R., Chen, G.L., Zhang, H. CO_2 Storage Safety and Leakage Monitoring in the CCS Demonstration Project of JiLin Oilfield, China. *Greenhouse Gases: Science and Technology*. 2014:4(4), 425-439. doi:10.1002/ghg.1411

Ren, S.R., Ren, B., Li, Y.Z., Zhang, L., Kang, W.L., Chen, G.L., Zhang, H. Monitoring Techniques and Their Application Analysis for Geological Storage of CO_2 (in Chinese). *Journal of China University of Petroleum (Natural Edition)*. 2012:36(1), 106-111.

Zhang, L., Ren, S.R., Ren, B., Zhang, W.D., Guo, Q., Zhang, L. Assessment of CO_2 Storage Capacity in Oil Reservoirs Associated with Large Lateral/underlying Aquifers: Case Studies from China. *International Journal of Greenhouse Gas Control*. 2011:5(4), 1016-1021. doi:10.1016/j.ijggc.2011.02.004

<u>Conference Proceedings (Non peer-reviewed)</u>

Ren, B., Duncan, I.J., Ren, G., Male, F. Toward A Sustainable Oil & Gas Industry: CO_2 EOR and Storage in Residual Oil Zones Utilizing Foam Injection. Accepted to be presented at SPE Annual Technical Conference and Exhibition, Dubai, United Arab Emirates, 21-23 September, 2021.

Ren, B., Jensen, J., Lake, L. W. Analysis and Importance of Vertical Permeability in a Carbonate Reservoir Undergoing CO_2 EOR. Accepted to be presented at SPE Annual Technical Conference and Exhibition, Dubai, United Arab Emirates, 21-23 September, 2021.

Ren, B., Duncan, I.J., Male, F., Baques, V., Lake, L. W. Economic Assessment of Strategies for CO_2-EOR and Storage in Brownfield Residual Oil Zones. SPE Improved Oil Recovery Conference, Tulsa, Oklahoman, USA, 29 August – 2 September 2020. https://doi.org/10.2118/200363-MS

Ren, B., Male, F., Baques, V., Duncan, I.J., Lake, L. W. Oil Saturation in Residual Oil Zones and Its Effects on CO_2 WAG Injection Strategies. SPE Annual Technical Conference and Exhibition, Calgary, Alberta, Canada, 9 September - 2 October, 2019. https://doi.org/10.2118/196230-MS

Ren, B., Duncan, I.J. CO_2 EOR and Associated Storage in Residual Oil Zones: Modeling the Evolution and Significance of Oil Saturation in Residual Oil Zones. Presented at the 14th International Conference on Greenhouse Gas Control Technologies (GHGT-14), Melbourne, Australia, 21-25 October, 2018.

Ren, B., Lake, L.W., Bryant, S.L. Countercurrent Flow Enhances CO_2 Accumulation During Upward Migration in Storage Aquifers. The 14th International Conference on Greenhouse Gas Control Technologies (GHGT-14), Melbourne, Australia, 21-25 October, 2018.

Ren, B., Delaney, J. M., Lake, L. W., Bryant, S. L. Maximizing CO_2 Accumulation in Storage Reservoirs: Interplay between Permeability Retardation and Capillary Trapping of Rising CO_2. SPE-187356-MS. SPE Annual Technical Conference and Exhibition, San Antonio, Texas, USA, 9-11 October, 2017. https://doi.org/10.2118/187356-MS

Li, D.X., Ren, B., Zhang, L., Yin, Z., Ren, S.R. Experimental Study on the Interfacial Tension of CO_2-Water Binary Mixtures for CO_2 Storage Safety. 78th European Association of Geoscience & Engineers Conference & Exhibition, Vienna, Austria, 30 May – 2 June 2016. https://doi.org/10.3997/2214-4609.201601074

Shi, H.F., Zhou, H.Y., Hu, Y., He, Y.F., Fu, R., Ren, B. A New Method to Design and Optimize the ICD for Horizontal Wells. OTC-26905-MS. Offshore Technology Conference, Houston, Texas, USA, 2–5 May 2016. http://dx.doi.org/10.4043/26905-MS

Liu, Y.M., Zhang, L., Ren, S.R., Ren, B., Wang, S.T., Xu, G.R. Injection of Nitrogen Foam for Improved Oil Recovery in Viscous Oil Reservoirs Offshore Bohai Bay China. SPE-179584-MS. SPE Improved Oil Recovery Conference, Tulsa, Oklahoma, USA, 11–13 April 2016. https://doi.org/10.2118/179584-MS

Ren, B., Bryant, S.L., Lake, L.W. Quantifying Local Capillary Trapping Storage Capacity Using Geologic Criteria. AIChE Carbon Management Technology Conference, Sugar Land, Texas, USA, 17-19 November, 2015. http://dx.doi.org/10.7122/439489-MS

Ren, B., Bryant, S.L., Lake, L.W. Fast Modeling of Local Capillary Trapping during CO_2 Injection into a Saline Aquifer. AIChE Carbon Management Technology Conference, Sugar Land, Texas, USA, 17-19 November, 2015. http://dx.doi.org/10.7122/439486-MS

Ren, B., Ren, S.R., Zhang, L., Huang, H.D., Chen, G.L., Zhang, H. Monitoring on CO_2 Migration in a Tight Oil Reservoir during CO_2-EOR Process. AIChE Carbon Management Technology Conference, Sugar Land, Texas, USA, 17-19 November, 2015. http://dx.doi.org/10.7122/439489-MS

Zhang, L., L, X., Ren, B., Gui, G.D., Ren, S.R. Preliminary Assessment of CO_2 Storage Potential in the H-59 Block in Jilin Oilfield CCS Project. AIChE Carbon Management Technology Conference, Sugar Land, Texas, USA, 17-19 November, 2015. http://dx.doi.org/10.7122/439497-MS

Cui, G.D., Zhang, L., Ren, B., Zhuang, Y., Li, X., Ren, S.R. Geothermal Exploitation with Considering CO_2 Mineral Sequestration in High Temperature Depleted Gas Reservoir by CO_2 Injection. AIChE Carbon Management Technology Conference, Sugar Land, Texas, USA, 17-19 November, 2015. http://dx.doi.org/10.7122/439516-MS

Ren, B., Sun, Y.H., Bryant, S.L. Maximizing Local Capillary Trapping during CO_2 Injection. Presented at 12th International Conference on Greenhouse Gas Control Technologies, Austin, Texas, USA, 5- 9 October, 2014. doi:10.1016/j.egypro.2014.11.590

Sun, Y.H., Ren, B., Bryant, S.L. Persistence of Local Capillary Trapping during Caprock Leakage and Forced Imbibition. 12th International Conference on Greenhouse Gas Control Technologies, Austin, USA, 5-9 October, 2014. doi:10.1016/j.egypro.2014.11.559

Zhang, L., Li, D.X., Ren, B., Cui, G.D., Zhang, Y., Ren, S.R. Potential Assessment of CO_2 Geological Storage in Geothermal Reservoirs Associated with Heat Mining: Case Studies from China. 12th International Conference on Greenhouse Gas Control Technologies, Austin, USA, 5-9 October, 2014. doi:10.1016/j.egypro.2014.11.590

Li, D.X., Zhang, L., Ren, B., Ren, S.R. Experimental Study of CO_2 Sensitive Chemicals for Enhanced Sealing of Leakage Pathways in CO_2 Geological Storage Process. 12th International Conference on Greenhouse Gas Control Technologies, Austin, USA, 5-9 October, 2014. doi:10.1016/j.egypro.2014.11.498

Ren, S.R., Niu, B.L., Ren, B., Li, Y.Z., Kang, W.L., Chen, G.L., Zhang, H. Monitoring on CO_2 EOR and Storage in a CCS Demonstration Project of Jilin Oilfield China. SPE-145440. SPE Annual Technical Conference and Exhibition, Denver, Colorado, United States, 30 Oct-2 Nov 2011. http://dx.doi.org/10.2118/145440-MS

Ren, B., Xu, Y., Niu, B.L., Ren, S.R., Li, X.L., Guo, P. Laboratory Assessment and Field Pilot of Near-miscible CO_2 Injection for IOR and Storage in a Tight Oil Reservoir of ShengLi Oilfield China, SPE-144108. SPE Enhanced Oil Recovery Conference, Kuala Lumpur, Malaysia, 19-21 July, 2011. http://dx.doi.org/10.2118/144108-MS

Abstracts/Extended Abstracts

Yoon, H., Kim, Y., Jeong, H., Sun, A., Ren, B. Deep-Learning-Based Surrogate Model for Brine Extraction Well Placement for Geological Carbon Storage. Accepted to be presented at InterPore Annual Meeting, Virtual, 31 May–4 June 2021.

Ren, B., Duncan, I.J., Male, F. The Impact of Pressure-Dependent Interfacial Tension and Contact Angle on Capillary Trapping and Storage of CO_2 in Aquifers. InterPore Annual Meeting Abstract, Virtual, 31 August–4 September 2020.

Ren, B., Lake, L.W., Bryant, S.L. Field-scale Modeling of Local Capillary Trapping during CO_2 Injection into a Saline Aquifer. American Geophysical Union Fall Meeting Abstract, San Francisco, USA, 14–18 December 2015.

Reports

Duncan, I., Jensen, J., Ren, B., Male, F., Ambrose, W.A. 2021. Improved Oil Recovery for Small Operators in the Permian Basin Texas: The University of Texas at Austin, Bureau of Economic Geology, report being prepared for small operators in Permian Basin.

Ambrose, W. A., Rogers, H., Smith, D. C., Scanlon, B. R., Paine, J. G., Nicot, J.-P., Young, M. H., Loucks, R. G., Hentz, T. F., Reed, R. M., Ogiesoba, O. C., Olariu, M. I., Fu, Q., Flaig, P. P., Zhang, J., Hattori, K., Roberts, A., Zeng, H., DeJarnett, B. B., Radjef, E., Periwal, P., Peng, S., Duncan, I. J., Ren, B., Jensen, J., Male, F., Dommisse, R., Eastwood, R., Carr, D. L., Zhang, T., Ko, L., Larson, T., Lawton, T., Covault, J., Sylvester, Z., Goodman, E., Calle, A., Smye, K. G., Pelletier, I., Dunlap, D. B., Lambert, J., and Sivil, J. E., 2021, State of Texas Advanced Resource Recovery (STARR) 2018-2020 biennium report: The University of Texas at Austin, Bureau of Economic Geology 44 p.

Bryant, S.L., Ren, B., Sun, Y.H. 2013. Influence of Local Capillary Trapping on Containment System Effectiveness: The University of Texas at Austin, Hildebrand Department of Petroleum & Geosystems

Engineering, 2nd, 3rd, and 4th quarter report prepared for the U.S. Department of Energy, under contract # FE0004956.

Ren, S.R., Ren, B.., Kang, W.L., Zhang, L., Li, Y.Z., Hao, Y.M., Niu, B.L., Xu, B., Cao, D.Q., Zhang, Y., Chen, B.L., Wang, L., Huang, H.D., Pei, J.J., Song, H. 2011, Reservoir Dynamics Monitoring and Program Optimization during CO_2-EOR: China University of Petroleum, School of Petroleum Engineering, midterm report prepared from the Jilin Oilfield, PetroChina, funded by National Science and Technology Major Projects of China, under contract # 2011ZX05016-005.

Lectures and Addresses

Local capillary trapping and permeability-retarded accumulation during geologic carbon sequestration: invited talk presented at Bob L. Herd Department of Petroleum Engineering, Texas Tech University, Graduate Seminar Series, Lubbock, Texas, April 19, 2021.

Economic assessment of strategies for CO_2-EOR and storage in brownfield residual oil zones: A case study from the Seminole San Andres Unit: invited talk virtually presented at SPE Improved Oil Recovery Conference, September 1, 2020.

Toward a sustainable oil & gas industry: CO_2 EOR and storage in residual oil zones utilizing foam injection: invited talk presented at Bureau of Economic Geology Tech Talk, Austin, Texas, September 30, 2019

Teaching old reservoirs new CO_2 science – high resolution geological modeling and reservoir simulation of CO_2 enhanced recovery (EOR) in the Seminole residual oil zone: invited talk presented at Bureau of Economic Geology Friday Seminar Series, Austin, Texas, April 26, 2019.

Maximizing CO_2 accumulation in storage reservoirs: interplay between permeability retardation and capillary trapping of rising CO_2: invited talk presented at SPE Annual Technical Conference and Exhibition, San Antonio, Texas, Oct 10, 2017.

Injection of nitrogen foam for improved oil recovery in viscous oil reservoirs offshore Bohai Bay China: invited talk presented at SPE Improved Oil Recovery Conference, Tulsa, Oklahoma, April 12, 2016.

Monitoring CO_2 migration in a tight oil reservoir during CCS-EOR in Jilin Oilfield China: invited talk presented at the Carbon Management Technology Conference, Sugar Land, Texas, November 18, 2015.

Field scale modeling of local capillary trapping during CO_2 injection into saline aquifers: invited talk presented at 2nd Biennial CO_2 for EOR as CCUS Conference, Houston, Texas, October 5, 2015.

Fast modeling of local capillary trapping based on geologic criteria: presented at Geological CO_2 Storage Research Review Meeting, Austin, Texas, January 20, 2015.

Analysis of Energy Utilization and CO_2 Emissions during Petroleum Production; poster presented at the British Petroleum (BP) TechnoFest Business Impact Session, Houston, Texas, August 6, 2014.

Maximizing local capillary trapping during CO_2 injection; presented at Geological CO_2 Storage Research Review Meeting & UTCCS-2 Conference, Austin, Texas, January 29, 2014.

Local capillary trapping in geologic carbon sequestration: student paper contest presentation at China American Petroleum Association Petroleum and Petrochemical Technical Symposium, Houston, Texas, October 25, 2013.

The effect of gravity number during injection on local capillary trapping – implications for leakage assessment: poster presented the DOE-NETL Carbon Storage R&D Project Review Meeting, Pittsburgh, Pennsylvania, August 21, 2013.

Monitoring CO_2 EOR performance and migration in a tight oil reservoir: invited talk presented at National Doctoral & Future Petroleum Engineers Forum Paper Contest, Beijing, China, September 27, 2011.

Laboratory assessment and field pilot of near-miscible CO_2 Injection for IOR and Storage in a tight oil reservoir of ShengLi Oilfield China: poster presented at the SPE Enhanced Oil Recovery Conference, Kuala Lumpur, Malaysia, July 20, 2011.