Zuleima T. Karpyn, Ph.D.

Associate Dean for Graduate Education and Research,
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PROFESSIONAL EXPERIENCE

2023 – 2024 **Visiting Fulbright Faculty Scholar**, Thermal and Fluids Engineering Department, Universidad Carlos III de Madrid, Madrid, Spain.

2020 – present **Associate Dean for Graduate Education and Research**, College of Earth and Mineral Sciences, The Pennsylvania State University.

2017 – present **Scientific Director, Center for Quantitative X-ray Imaging**, Energy and Environmental Sustainability Laboratories, Institutes of Energy and the Environment, The Pennsylvania State University.

2019 – 2020 **Coordinator of STEM Faculty Development Initiatives**, Office of the Vice Provost for Faculty Affairs, The Pennsylvania State University.

2017 – 2020 **Program Chair, Petroleum and Natural Gas Engineering**, John and Willie Leone Family Department of Energy and Mineral Engineering, The Pennsylvania State University.

2016 – 2017 **Visiting Fulbright Faculty Scholar**, School of Mines, Universidad Nacional de Colombia, Medellín, Colombia.

2010 – 2017 **Director, Center for Quantitative X-ray Imaging**, Earth and Mineral Sciences (EMS) Energy Institute, The Pennsylvania State University.

2013 – 2014 **Interim Director, EMS Energy Institute**, College of Earth and Mineral Sciences, The Pennsylvania State University.

ACADEMIC APPOINTMENTS

2016 – present **Professor, Petroleum and Natural Gas Engineering**, John and Willie Leone Family Department of Energy and Mineral Engineering, The Pennsylvania State University.

2011 – 2016 **Associate Professor, Petroleum and Natural Gas Engineering**, John and Willie Leone Family Department of Energy and Mineral Engineering, The Pennsylvania State University.

2005 – 2011 **Assistant Professor, Petroleum and Natural Gas Engineering**, John and Willie Leone Family Department of Energy and Mineral Engineering (formerly Department of Energy and Geo-Environmental Engineering), The Pennsylvania State University.

2003 – 2004 **Instructor, Petroleum and Natural Gas Engineering**, Department of Energy and Geo-Environmental Engineering, The Pennsylvania State University.

EDUCATION

2005 **Ph.D., Petroleum and Natural Gas Engineering**, The Pennsylvania State University.

2001 **M.S., Petroleum and Natural Gas Engineering**, The Pennsylvania State University.

1997 **B.S., Chemical Engineering**, Universidad Central de Venezuela. Caracas, Venezuela.

HONORS AND AWARDS

- SPE Distinguished member, Society of Petroleum Engineers, 2024.
- Fulbright U.S. Scholar Award, The United States Department of State's Bureau of Educational and Cultural Affairs, 2024.
- SPE Regional Reservoir Description and Dynamics Award, Society of Petroleum Engineers Eastern North America Region, 2023.
- Donohue Family Professorship in Petroleum Engineering, The Pennsylvania State University, 2021.
- Big Ten Academic Leadership Fellow, Big Ten Academic Alliance, 2018-2019.
- Administrative Fellow, Office of the Executive Vice President and Provost, The Pennsylvania State University, 2018-2019.
- Fulbright U.S. Scholar Award, Fulbright – Colciencias Innovation and Technology, The United States Department of State's Bureau of Educational and Cultural Affairs, 2016.
- Energí Simulation (formerly Foundation CMG) Chair in Fluid Behavior and Rock Interactions, 2014-2020.
- Quentin E. and Louise L. Wood Endowed Faculty Fellow in Petroleum and Natural Gas Engineering, The Pennsylvania State University, 2010.
- Wilson Award for Excellence in Teaching, The Pennsylvania State University, 2010.
- Faculty Early Career Development (CAREER) Award, National Science Foundation, 2008.
- Outstanding Service to the American Association of Petroleum Geologists - Eastern Section, as Technical Program Co-Chair of the AAPG-SPE 2008 Eastern Meeting, Pittsburgh, Pennsylvania, 2008.
- Wilson Research Initiation Grant, The Pennsylvania State University, 2005.
- Student Awards: 2nd place at 2003 Penn State Annual Graduate Exhibition - Engineering division; 1st place at 2001 International SPE Student Paper Contest - Master's division; 1st place at 2001 Rocky Mountain Regional SPE Student Paper Contest - Master's division; 3rd place at 2001 Penn State Annual Graduate Exhibition - Engineering Division; 1999-2000 Fundación Gran Mariscal de Ayacucho Scholarship, Venezuela; 1991-1996 Talent Award Scholarship, Fundación Gran Mariscal de Ayacucho, Venezuela.

COURSES TAUGHT

- **PNG 405:** ROCK AND FLUID PROPERTIES - Introduction to petroleum reservoir rock and fluid properties, coring methods, and principles of flow in porous media. Class size: *30-210 students*.
- **PNG 406:** ROCK AND FLUID LABORATORY - Systematic study of oil reservoir rocks and fluids, and their interrelation applied to petroleum engineering. Class size: *6-15 students*.
- **PNG 475:** PRODUCTION AND COMPLETIONS ENGINEERING – Well inflow performance and subsurface production principles of oil and gas reservoirs. Class size: *12-210 students*.
- **PNG 492:** PETROLEUM ENGINEERING CAPSTONE DESIGN PROJECT – Integration of petroleum and natural gas engineering concepts to project design. Class size: *83 students*.

- **PNG 501:** FLOW IN POROUS MEDIA – Governing equations and formulation of problems of fluid flow in porous media. Class size: *8-40 students.*
- **PNG 590:** COLLOQUIUM - graduate seminars series. Class size: *12 students.*
- **EGEE 101:** ENERGY AND THE ENVIRONMENT - Energy utilization and technological development, energy resources, conversion and consequences on the local and global environment, and energy alternatives. Class size: *75 students.*

ARTICLES PUBLISHED IN REFEREED JOURNALS

Published and accepted

1) Gomez Mendez, I., El Sayed, W., Menefee, A., **Karpyn, Z.**, 2024, Insights into Underground Hydrogen Storage Challenges: A Review on Hydrodynamic and Biogeochemical Experiments in Porous Media, *Energy & Fuels*. https://doi.org/10.1021/acs.energyfuels.4c03142
2) Purswani, P., Johns, R., and **Karpyn, Z.**, 2024, Impact of wettability on capillary phase trapping using pore-network modeling, *Advances in Water Resources*. 184, February, https://doi.org/10.1016/j.advwatres.2023.104606
3) Landry, C., Eichhubl, P., Prodanovic, M., and **Karpyn, Z.**, 2024, Estimation of fracture permeability from aperture distributions for rough and partially cemented fractures, *Transport in Porous Media*. https://doi.org/10.1007/s11242-024-02059-y
4) Purswani, P., Johns, R., and **Karpyn, Z.**, 2024, Relationship between Residual Saturations and Wettability using Pore-Network Modeling, SPE J. 29 (04), April, https://doi.org/10.2118/206379-PA
5) Zhang, T., Payne, K., Zhang, J., Purswani, P., **Karpyn, Z.**, and Wang, M. 2024. "Hybrid Ion Exchange and Biological Processes for Water and Wastewater Treatment: A Comprehensive Review of Process Applications and Mathematical Modeling," *Reviews in Environmental Science and Bio/Technology,* 23, pages 163-188, https://doi.org/10.1007/s11157-023-09677-w
6) Tawfik, M.S.; **Karpyn, Z.T.**; Johns, R.T. 2022. Effect of Oil Chemistry on the Performance of Low-Salinity Waterflooding in Carbonates: An Integrated Experimental Approach, Fuel 329 (5) 10.1016/j.fuel.2022.125436
7) Lou, X., Chakraborty, N., and **Karpyn, Z.**, 2022, "Experimental Investigation of Shale Rock Properties Altering in-situ Gas Density and Storage Capacity," *Frontiers in Earth*, April. https://doi.org/10.3389/feart.2022.877551
8) Tawfik, M., Subbakrishna, A., Hsi, Y., Purswani, P., Johns, R., Shokouhi, P., Huang, X., and **Karpyn, Z.,** 2022, Comparative Study of Traditional and Deep-Learning Denoising Approaches for Image-based Petrophysical Characterization of Porous Media, *Frontiers in Water*, Vol 3, January. https://doi.org/10.3389/frwa.2021.800369
9) Chakraborty, N., Lou, X., Enab, K., and **Karpyn, Z.**, 2022, "Measurement of In-situ Fluid Density in Shales with Sub-Resolution Porosity using X-Ray Microtomography." *Transport in Porous Media*. 141, 607–627. https://doi.org/10.1007/s11242-021-01738-4
10) Magzymov, D., Johns, R. T., **Karpyn, Z.**, & Purswani, P., 2021, Modeling the Effect of Reaction Kinetics and Dispersion during Low-Salinity Waterflooding. *SPE Journal*. 26(5), 3075-3093, DOI: https://doi.org/10.2118/193909-PA
11) Purswani, P., Johns, R., **Karpyn, Z.**, and Blunt, M. 2021, "Predictive Modeling of Relative Permeability using a Generalized Equation-of-State," *SPE Journal*, *26*(01), 191-205, DOI: https://doi.org/10.2118/200410-PA

12) Zhang, M., Chakraborty, N., **Karpyn, Z.T.**, and Emami-Meybodi, H. and Ayala. L., 2021, "Experimental and Numerical Study of Gas Diffusion and Sorption Kinetics in Ultratight Rocks," *Fuel*. 286, 1-12. DOI: https://doi.org/10.1016/j.fuel.2020.119300
13) Zhou, S., Liu, D., **Karpyn, Z.**, Cai, Y., & Yao, Y., 2021, "Dual Compressibility Characteristics of Lignite, Subbituminous, and High-Volatile Bituminous Coals: A New Insight into Permeability," *Transport in Porous Media*, 136(1), 295-317. DOI: https://doi.org/10.1007/s11242-020-01512-y
14) Lou, X., Chakraborty, N., **Karpyn, Z.**, Ayala, L., Nagarajan, N., and Wijaya, Z. 2021, "Experimental Study of Gas/Liquid Diffusion in Porous Rocks and Bulk Fluids to Investigate the Effect of Rock Matrix Hindrance," *SPE Journal*, 26(3), 1174-1188. DOI: https://doi.org/10.2118/195941-PA
15) Purswani, P., **Karpyn, Z.T.**, Enab, K., Xue, Y. and Huang, S. 2020, "Evaluation of Image Segmentation Techniques for Image-Based Rock Property Estimation," Journal of Petroleum Science and Engineering. 15(December), 166-172. DOI: https://doi.org/10.1016/j.petrol.2020.107890
16) Chakraborty, N., **Karpyn, Z**., Liu, S., Yoon, H., and Dewers, T., 2020, "Experimental evidence of gas densification and enhanced storage in nanoporous shales." Journal of Natural Gas Science & Engineering. 76 (103120), DOI: https://doi.org/10.1016/j.jngse.2019.103120
17) Xiong, B., Purswani, P., Pawlik, T., Samineni, L., **Karpyn, Z.T.**, Zydney, A., & Kumar, M., 2020, "Mechanical Degradation of Polyacrylamide at Ultra High Shear Rates during Hydraulic Fracturing." Environmental Science: Water Research & Technology, 1(6), 166-172. DOI: https://doi.org/10.1039/C9EW00530G
18) Purswani, P., Tawfik, M., **Karpyn, Z.T.**, & Johns, R. T., 2020, "On the Development of a Relative Permeability Equation of State". Computational Geosciences, 24, 807-818. DOI: https://doi.org/10.1007/s10596-019-9824-2.
19) Liu, S., Zhang, R., **Karpyn, Z.T.**, Yoon, H., & Dewers, T., 2019, "Investigation of Accessible Pore Structure Evolution under Pressurization and Adsorption for Coal and Shale Using Small-Angle Neutron Scattering". Energy & Fuels, 33(2), 837-847. DOI: https://doi.org/10.1021/acs.energyfuels.8b03672.
20) Purswani, P., and **Karpyn, Z.T.**, 2019 "Laboratory Investigation of Chemical Mechanisms Driving Oil Recovery from Oil-Wet Carbonate Rocks". Fuel, Volume 235, 406-415. DOI: 10.1016/j.fuel.2018.07.078.
21) Zhou, S., Liu, D., Cai, Y., **Karpyn, Z.T.**, and Yao, Y., 2018, "Comparative analysis of nanopore structure and its effect on methane adsorption capacity of Southern Junggar coalfield coals by gas adsorption and FIB-SEM tomography". Microporous and Mesoporous Materials, 272 (December): 117-128. DOI: 10.1016/j.micromeso.2018.06.027.
22) Zhou, S., Liu, D., Cai, Y., **Karpyn, Z.T.**, and Yao, Y., 2018, "Petrographic Controls on Pore and Fissure Characteristics of Coals from the Southern Junggar Coalfield, Northwest China". Energies, 11 (1556): 1-22. DOI: 10.3390/en11061556.
23) Dewers, T., Heath, J., Yoon, H., Ingraham, M., Grigg, J., Mozley, P., and **Karpyn, Z.T.**, 2018. Part I-3, "Pore-to-Core Characterization of Shale Multiphysics", in Geological Carbon Storage: Subsurface Seals and Caprock Integrity, American Geophysical Union, 384 pages, ISBN: 978-1-119-11864-0.
24) Purswani, P., Tawfik, M.S., and **Karpyn, Z.T.**, 2017. "Factors and mechanisms governing wettability alteration by chemically tuned waterflooding: a review". *Energy & Fuels*, 31 (8):7734-7745. DOI: 10.1021/acs.energyfuels.7b01067.
25) Abdelmalek, B., **Karpyn, Z. T.**, Liu, S., Yoon, H., and Dewers, T., 2017. "Gas permeability measurements from pressure-pulse decay laboratory data using Pseudo-pressure and Pseudo-

time transformations". *Journal of Petroleum Exploration and Production Technology*, https://doi.org/10.1007/s13202-017-0376-5.

26) Chakraborty, N., **Karpyn, Z.T.**, Liu, S., and Yoon, H., 2017. "Permeability Evolution of Shale during Spontaneous Imbibition". *Journal of Natural Gas Science and Engineering*, 38 (February): 590-596, DOI: 10.1016/j.jngse.2016.12.031.
27) Klise, K., Moriarty, D., Yoon, H., and **Karpyn, Z.T.**, 2016. "Automated contact angle estimation for three-dimensional X-ray microtomography data". *Advances in Water Resources*, 95 (September): 152–160, DOI: 10.1016/j.advwatres.2015.11.006.
28) Brunet, J.-P., Li, L., **Karpyn, Z.T.**, Huerta, N., 2016. "Fracture opening and self-healing: critical residence time as a unifying parameter for diverging cement fracture property evolution under carbon sequestration conditions". *International Journal of Greenhouse Gas Control*, 47 (April): 25-37. DOI: 10.1016/j.ijggc.2016.01.024.
29) Cao, P., **Karpyn, Z.T.**, and Li, L., 2016. "The role of host rock properties in determining potential CO_2 leakage pathways". *International Journal of Greenhouse Gas Control*, 45 (February): 18-26. DOI: 10.1016/j.ijggc.2015.12.002.
30) Torrealba, V. A., **Karpyn, Z. T.**, Yoon, H., Klise, K. A., and Crandall, D., 2016. "Pore-scale investigation on stress-dependent characteristics of granular packs and their impact on fluid distribution". *Geofluids*, 16(1): 198-207. DOI: 10.1111/gfl.12143.
31) Cao, P., **Karpyn, Z.T.**, and Li, L., 2015. "Self-healing of cement fractures under dynamic flow of CO_2-rich brine". *Water Resources Research*, 51(6): 4684-4701. DOI: 10.1002/2014WR016162.
32) Aksu, I., Bazilevskaya, K., and **Karpyn, Z.T.**, 2015. "Swelling of clay minerals in unconsolidated porous media and its impact on permeability". *GeoResJ*, 7(September): 1-13. DOI:10.1016/j.grj.2015.02.003.
33) Alexis, D., **Karpyn, Z.T.**, Ertekin, T., and Crandall, D., 2015. "Fracture permeability and relative permeability of coal and their dependence on stress conditions". *Journal of Unconventional Oil and Gas Resources*, 10(June): 1-10. DOI:10.1016/j.juogr.2015.02.001.
34) Yan, Q., Lemanski, C., **Karpyn, Z.T.**, and Ayala H., L.F., 2015. "Experimental investigation of shale gas production impairment due to fracturing fluid migration during shut-in time". *Journal of Natural Gas Science & Engineering*, 24(May): 99-105. DOI:10.1016/j.jngse.2015.03.017.
35) Li, X., Akbarabadi, M., **Karpyn, Z.T.**, Piri, M. and Bazilevskaya, E., 2015. "Experimental investigation of carbon dioxide trapping due to capillary retention in saline aquifers". *Geofluids*, 15(1-2): 1-14. DOI: 10.1111/gfl.12127.
36) Thararoop, P., **Karpyn, Z.T.**, and Ertekin, T., 2015. "A production type-curve solution for coalbed methane reservoirs". *Journal of Unconventional Oil and Gas Resources*, 9(March): 136-152. DOI:10.1016/j.juogr.2014.12.001.
37) Thararoop, P., **Karpyn, Z.T.**, and Ertekin, T., 2015. "Development of Material Balance Equation for Coalbed Methane Reservoirs Accounting for the Presence of Water in the Coal Matrix and Coal Shrinkage and Swelling". *Journal of Unconventional Oil and Gas Resources*, 9(March): 153-162. DOI:10.1016/j.juogr.2014.12.002.
38) Ghazanfari, E., Pamukcu, S., Pervizpour, M., and **Karpyn, Z.T.**, 2014. "Investigation of generalized relative permeability coefficients for electrically assisted oil recovery in oil formations". *Transport in Porous Media*, 105(1): 235-253. DOI: 10.1007/s11242-014-0368-6.
39) Landry, C. J., **Karpyn, Z.T.**, and Ayala, O.M., 2014. "Relative permeability of homogeneous-wet and mix-wet porous media as determined by pore-scale Lattice Boltzmann modeling". *Water Resources Research*, 50(5): 3672-3689. DOI:10.1002/2013WR015148.

40) Landry, C. J., **Karpyn, Z.T.**, and Ayala, O.M., 2014. "Pore-scale lattice Boltzmann modeling and 4D x-ray computed microtomography imaging of fracture-matrix fluid transfer". *Transport in Porous Media*, 103 (3): 449-468. DOI:10.1007/s11242-014-0311-x.
41) Odumabo, S., **Karpyn, Z.T.**, and Ayala H., L.F., 2014. "Investigation of gas flow hindrance due to fracturing fluid leak off in low permeability formations". *Journal of Natural Gas Science and Engineering*, 17(3): 1-12. DOI:10.1016/j.jngse.2013.12.002.
42) Dutta, R., Lee, C.-H., Odumabo, S., Ye, P., Walker, S.C., **Karpyn, Z.T.**, and Ayala H., L.F., 2014. "Experimental investigation of fracturing-fluid migration due to spontaneous imbibition in fractured low-permeability sands". *SPE Reservoir Evaluation & Engineering*, 17(1): 74-81. DOI:10.2118/154939-PA.
43) Celauro, J.G., Torrealba, V.A., **Karpyn, Z.T.**, Klise, K.A., and McKenna, S.A., 2014. "Pore-scale multiphase flow experiments in bead packs of variable wettability". *Geofluids*, 14(1): 95-105. DOI: 10.1111/gfl.12045.
44) Brunet, J.-P., Li, L., **Karpyn, Z.T.**, Kutchko, B.G., Strazisar, B., and Bromhal, G., 2013. "Dynamic evolution of cement composition and transport properties under conditions relevant to geological carbon sequestration". *Energy and Fuels*, 27(8): 4208-4220. DOI: 10.1021/ef302023v.
45) Larpudomlert, R., Torrealba, V., **Karpyn, Z.T.**, and Halleck, P.M., 2013. "Experimental investigation of residual saturation in mixed-wet porous media using a pore-scale approach". *Journal of Petroleum Exploration and Production Technology*, September: 1-13. DOI 10.1007/s13202-013-0076-8.
46) Cao, P., **Karpyn, Z.T.**, and Li, L., 2013. "Dynamic alterations in wellbore cement integrity due to geochemical reactions in CO2-rich environments". *Water Resources Research*, 49(6): 1-11. DOI: 10.1002/wrcr.20340.
47) Lee, C.-H. and **Karpyn, Z.T.**, 2012. "Numerical analysis of imbibition front evolution in fractured sandstone under capillary dominated conditions". *Transport in Porous Media*, 94(1): 359-383. DOI: 10.1007/s11242-012-0009-x.
48) Thararoop, P., **Karpyn, Z.T.**, and Ertekin, T., 2012. "Development of a multi-mechanistic, dual-porosity, dual-permeability, numerical flow model for coalbed methane reservoirs". *Journal of Natural Gas Science and Engineering*, 8(1): 121-131. DOI: 10.1016/j.jngse.2012.01.004.
49) Landry, C. and **Karpyn, Z.T.**, 2012. "Single-phase lattice Boltzmann simulations of pore-scale flow in fractured permeable media". *International Journal of Oil, Gas and Coal Technology*, 5(2/3): 182-206. DOI: 10.1504/IJOGCT.2012.046320.
50) Thararoop, P., **Karpyn, Z.T.**, and Ertekin, T., 2012. "Numerical studies on the effects of water presence in the coal matrix and coal shrinkage and swelling phenomena on CO2-enhanced coalbed methane recovery process". *International Journal of Oil, Gas, and Coal Technology*, 5(1): 47-65.
51) Nago, A., **Karpyn, Z.T.**, and Ayala H., L. F., 2011. "Multivariate production optimization of a natural gas field". *International Journal of Modeling and Simulation*, 31(3): 185-193. DOI: 10.2316/Journal.205.2011.3.205-5381.
52) Landry, C., **Karpyn, Z.T.**, and Piri, M., 2011. "Pore-scale analysis of trapped immiscible fluid structures and fluid interfacial areas in oil-wet and water-wet bead packs". *Geofluids*, 11(2): 209-227. DOI: 10.1111/j.1468-8123.2011.00333.x.
53) Basbug, B., and **Karpyn, Z.T.**, 2011. "Estimation of fracture-matrix transport properties from saturation profiles using a multivariate automatic history matching method". *Petroleum Science and Technology*, 29(9), 1-11. DOI: 10.1080/10916460903514915.

54) Petchsingto, T., and **Karpyn, Z.T.**, 2010. "Simulation of fluid percolation in a rough-walled rock fracture". *Hydrogeology Journal*, 18(7), 1583-1589. DOI: 10.1007/s10040-010-0632-y.
55) Mora, T., Orogbemi, O., and **Karpyn, Z.T.**, 2010. "A study of hydraulic fracture conductivity and its dependence on proppant wettability". *Petroleum Science and Technology*, 28(15), 1527-1534. DOI: 10.1080/10916460903070645.
56) Crandall, D., Bromhal, G. S., and **Karpyn Z. T.**, 2010. "Numerical simulations examining the relationship between wall-roughness and fluid flow in rock fractures". *International Journal of Rock Mechanics and Mineral Sciences*, 47(5), 784-796. DOI: 10.1016/j.ijrmms.2010.03.015.
57) Lee, C.-H. and **Karpyn, Z.T.**, 2010. "Experimental investigation of rate effects on two-phase flow through fractured rocks using x-ray computed tomography". *Advances in X-Ray Microtomography for Geomaterials* (eds. Alshibli, K.A. & Reed, A.H.) 230-237 (John Wiley & Sons).
58) **Karpyn, Z.T.**, Piri, M., and Singh, G., 2010. "Experimental investigation of trapped oil clusters in a water-wet bead pack using x-ray microtomography". *Water Resources Research*, 46(4), W04510, 1-25. DOI: 10.1029/2008wr007539.
59) Prodanović, M., Bryant, S.L. and **Karpyn, Z.T.**, 2010. "Investigating matrix/fracture transfer via a level set method for drainage and imbibition". *Society of Petroleum Engineers Journal*, 15(1), 125-136.
60) Thararoop, P., **Karpyn, Z.T.**, and Ertekin, T., 2009. "Development of a coal shrinkage-swelling model accounting for water content in the micropores". *International Journal of Mining and Mineral Engineering*, 1(4), 346-364.
61) Petchsingto, T., and **Karpyn, Z.T.**, 2009. "Deterministic modeling of fluid flow through a CT-scanned fracture using computational fluid dynamics". *Energy Sources, Part A*, 31(11), 897-905. DOI: 10.1080/15567030701752842.
62) **Karpyn, Z.T.**, Halleck, P.M., and Grader, A.S., 2009. "An experimental study of spontaneous imbibition in fractured sandstone with contrasting sedimentary layers". *Journal of Petroleum Science and Engineering*, 67(1-2): 48-56. DOI: 10.1016/j.petrol.2009.02.014.
63) **Karpyn, Z.T.**, Alajmi, A., Radaelli, F., Halleck, P., and Grader, A., 2009. "X-ray CT and hydraulic evidence for a relationship between fracture conductivity and adjacent matrix porosity". *Engineering Geology*, 103(3-4): 139-145. DOI: 10.1016/j.enggeo.2008.06.017.
64) Thararoop, P., **Karpyn, Z.T.**, Gitman, A., and Ertekin, T. 2008. "Integration of seismic attributes and production data for infill drilling strategies – a virtual intelligence approach". *Journal of Petroleum Science and Engineering*, 63(1-4): 43-52.
65) Basbug, B., and **Karpyn, Z.T.**, 2008. "A study of absolute permeability dependence on pore-scale characteristics of carbonate reservoirs using artificial intelligence". *International Journal of Oil, Gas and Coal Technology*, 1(4): 382-398.
66) **Karpyn, Z.T.**, and Piri, M., 2007. "Prediction of fluid occupancy in fractures using network modeling and X-ray microtomography. I: Data conditioning and model description". *Physical Review E*, 76(1), 016315: 1-13.
67) Piri, M., and **Karpyn, Z.T.**, 2007. "Prediction of fluid occupancy in fractures using network modeling and X-ray microtomography. II: Results". *Physical Review E*, 76(1), 016316: 1-11.
68) Ayala H., L.F., and **Karpyn, Z.T.**, 2007. "On the calculation of static bottom-hole pressures in gas wells". *Petroleum Science and Technology*, 25(8): 1099-1104.
69) **Karpyn, Z.T.**, Grader, A.S. and Halleck, P.M., 2007. "Visualization of fluid occupancy in a rough fracture using micro-tomography". *Journal of Colloid and Interface Science*, 307(1): 181-187.

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71) **Karpyn, Z.T.**, Li, G., Grader, A.S., and Halleck, P.M., 2006. "Experimental conditions favoring the formation of fluid banks during counter-current flow in porous media". *Transport in Porous Media*, 62(1): 109-124.
72) Li, G., **Karpyn, Z.T.**, Halleck, P.M., and Grader, A.S., 2005. "Numerical simulation of a CT-scanned counter-current flow experiment". *Transport in Porous Media*, 60(2): 225-240.

TECHNICAL AND PROFESSIONAL PRESENTATIONS

National Symposia

1) Nwankwo, I., Male, F., and **Karpyn, Z.T.**, 2024 "Deep-Learning Base Model to Capture Scale Relations in Rock Property Distribution," *Fall Meeting of AGU*, Washington, DC, December 9-13.
2) Tunwal, M., Hajek, E. A. and **Karpyn, Z. T.**, 2022 "Multi-Scale Analysis of Simulated Meandering Fluvial Systems: Implications of Depositional Conditions on 3D Geological Model Development," The Geological Society of America (GSA) Annual Meeting, Denver, Colorado, October 9–12.
3) Purswani P., Hsi Y., **Karpyn Z.T.**, 2022 "Deep-Learning Enabled Image Processing Platform for Porous Media Characterization," in Carbon Management Review Meeting, Pittsburgh, 17-18 August.
4) Purswani, P., Hsi, Y., Niu, F., Huang, S., **Karpyn, Z.**, Shokouhi, P., 2021. "Comparison of Supervised Machine Learning Image Segmentation Algorithms for Petrophysical Characterization of a Saturated Porous Medium," AGU Fall Meeting, December 13-17.
5) Tunwal, M., Trampush, S., Hajek, E., **Karpyn, Z.**, 2021. "Multi-Scale Analysis of Petrophysical Properties Using Simulated Sedimentary Depositional Systems," AGU Fall Meeting, December 13-17.
6) Borate, P., Purswani, P., Poska, M., **Karpyn, Z.**, Huang, X., Shokouhi, P. 2021. "Understanding the Seismic Response to Varying CO2 Saturation through Concurrent Ultrasonic Monitoring and X-ray CT Imaging in Laboratory-scale Flow Experiments," AGU Fall Meeting, December 13-17.
7) Lou, X., **Karpyn, Z.** 2021 "Experimental Investigation of Conditions Favoring Enhanced Gas Storage in Shales," Shale Insight 2021 University Research Showcase, Erie, Pennsylvania, September 28-30.
8) Hsi, Y., Niu, F., Purswani, P., Huang, X., **Karpyn, Z.,** and Shokouhi, P., 2021 "Deep-learning-based Image Segmentation Techniques for Porous Media Property Estimation," 13th Annual Meeting of InterPore, Online, 31 May – 4 June.
9) Niu, F., Tawfik, M., and **Karpyn, Z.,** 2020. "Experimental Investigation of Pressure Dependence of Contact Angle Measurement in CO2/Brine Systems," AGU Fall Meeting, Virtual, December 7.
10) Purswani, P., Johns, R., **Karpyn, Z.T.,** Blunt, M., 2020. "Predictive Modeling of Relative Permeability using a Generalized Equation-of-State". SPE Improved Oil Recovery Conference, Tulsa, Oklahoma, Virtual, August 31-September 4.
11) **Karpyn, Z.T.**, Chakraborty, N., Liu, S., Yoon, H., and Dewers, T., 2019. "Image-based analysis of gas densification and enhanced storage in nanoporous rocks". AGU Fall Meeting, San Francisco, CA, December 9-13.
12) Magzymov, D., Purswani, P., Johns, R., and **Karpyn, Z.T.**, 2019. "Modeling the Effect of Reaction Kinetics and Dispersion During Low-Salinity Waterflooding", 19RSC-P-1413-SPE. SPE Reservoir Simulation Conference, Galveston, TX, April 10-11.

13) Zhang, M., Chakraborty, N., **Karpyn, Z.T.**, Emami-Meybodi, H., and Ayala, L.F., 2019. "Numerical and Experimental Analysis of Diffusion and Sorption Kinetics Effects in Marcellus Shale Gas Transport". SPE Reservoir Simulation Conference, Galveston, TX, April 10-11.
14) Chakraborty, N., **Karpyn, Z.T.**, Liu, S., and Yoon, H., 2018. "Experimental evidence of gas storage and phase densification in ultra-tight shale". Gordon Research Conference on Flow & Transport In Permeable Media, Newry, ME, July 8-13.
15) Purswani, P., **Karpyn, Z.T.**, and Johns, R., 2018. "Correlating transport parameters impacting multi-phase flow through permeable media". Gordon Research Conference on Flow & Transport In Permeable Media, Bates College, Newry, ME, July 6-13.
16) Purswani, P., and **Karpyn, Z.T.**, 2017. "Improving understanding of the chemical mechanism of oil recovery from oil-wet carbonate reservoirs: an experimental approach". AGU Fall Meeting, New Orleans, LA, December 11-15.
17) Tawfik, M., and **Karpyn, Z.T.**, 2017. "Pore-scale investigation of wettability alteration through chemically-tuned waterflooding in oil-wet carbonate rocks using X-ray microCT imaging". AGU Fall Meeting, New Orleans, LA, December 11-15.
18) Purswani, P., and **Karpyn, Z.T.,** 2016. "Effect of brine composition on wettability alteration and oil recovery from oil-wet carbonate rocks". AGU Fall Meeting, San Francisco, CA, December 12-16.
19) Brunet, L., Li, L., **Karpyn, Z.T.**, and Huerta, N., 2016. "Flow through cement fractures under geological carbon sequestration conditions: critical residence time as a unifying parameter for fracture opening or self-sealing behavior". AGU Fall Meeting, San Francisco, CA, December 12-16.
20) Bonotto, G., Morgan, E.C., and **Karpyn, Z.T.**, 2016. "A comparison of patchy saturation velocity models to ultrasonic tests". AGU Fall Meeting, San Francisco, CA, December 12-16.
21) **Karpyn, Z.T.**, 2015. "Fluid behavior and rock interactions: gas flow hindrance in fractured unconventional reservoirs". SPE Reservoir Simulation Symposium, Houston, TX, February 23-25.
22) Abdelmalek, B., **Karpyn, Z.T.**, and Liu, S., 2014. "Structure, mechanics and flow properties of fractured shale: core-scale experimentation and in-situ imaging". AGU Fall Meeting, San Francisco, CA, December 15-19.
23) Klise, K., Yoon, H., Torrealba, V., **Karpyn, Z.T.**, and Moriarty, D., 2014. "Digital image analysis of stress-dependent granular compaction and its impact on multiphase fluid distributions". AGU Fall Meeting, San Francisco, CA, December 15-19.
24) Cao, P., **Karpyn, Z.T.**, and Li, L., 2014. "Chemical degradation and evolution of transport properties of wellbore cement in CO2-rich media". Gordon Research Conference on Flow & Transport In Permeable Media, Bates College, Lewiston, ME, July 6-11.
25) Torrealba, V., **Karpyn, Z.T.**, Yoon, H., Klise, K., and Crandall, D., 2014. "Stress deformation of unconsolidated porous media and its impact on pore geometry and phase trapping". Geosciences Research Symposia, U.S. Department of Energy, Office of Basic Energy Sciences, Gaithersburg, Maryland, May 15-16.
26) Cao, P., **Karpyn, Z.T.**, and Li, L., 2013. "Porosity and permeability evolution in cemented rock cores under reactive flowing conditions: Comparative analysis between limestone and sandstone host rocks". AGU Fall Meeting, San Francisco, CA, December 9-13.
27) Landry, C., **Karpyn, Z.T.**, and Ayala, O., 2013. "Pore-scale lattice Boltzmann modeling and 4D x-ray computed microtomography imaging of fracture-matrix fluid transfer". AGU Fall Meeting, San Francisco, CA, December 9-13.

28) Torrealba, V., **Karpyn, Z.T.**, Yoon, H., Hart, D., Klise, K., and Crandall, D., 2013. "Pore-Scale investigation on stress-dependent characteristics of granular packs and their impact on multiphase fluid distribution". AGU Fall Meeting, San Francisco, CA, December 9-13.
29) Alexis, D., **Karpyn, Z.T.**, Ertekin, T., and Crandall, D., 2013. "Experimental investigation of multiphase fluid transport characteristics in coal fractures," International Conference on Coal Science & Technology, State College, PA , Sept. 29 - Oct. 3.
30) Alexis, D., **Karpyn, Z.T.**, Ertekin, T., and Crandall, D., 2013. "Effects of net stress on two-phase flow in coal fractures". SPE/AAPG/SEG Unconventional resources technology conference, Denver, CO, August 12-14.
31) Cao, P., **Karpyn, Z.T.**, and Li, L., 2013. "Evolution of voids and fractures in wellbore cement under dynamic flow conditions relevant to geological carbon sequestration". AAPG 2013 Annual Convention & Exhibition, Pittsburgh, PA, May 19-22.
32) Bansal, Y., Ertekin, T., **Karpyn, Z.T.**, Ayala H., L.F., Nejad, A., Suleen, Balogun, O., Liebmann, D., and Sun, Q., 2013. "Forecasting well performance in a discontinuous tight oil reservoir using artificial neural networks". SPE Unconventional Resources Conference, The Woodlands, TX, 10-12 April.
33) Cao, P, **Karpyn, Z.T.**, and Li, L., 2012. "Property evolution of fractured wellbore cement under dynamic flow conditions relevant to geological carbon sequestration". AGU Fall Meeting, San Francisco, CA, December 3-7.
34) Landry, C., **Karpyn, Z.T.**, and Ayala, O.M., 2012. "Saturation-history-dependent wettability and its impact on macroscale two-phase flow: As determined by lattice Boltzmann modeling". AGU Fall Meeting, San Francisco, CA, December 3-7.
35) Brunet, J.-P., Li, L., **Karpyn, Z.T.**, Strazisar, B., and Kutchko, B., 2012. "Cement degradation under conditions relevant to geological carbon sequestration". AIChE Annual Meeting, Pittsburgh, PA, October 28 – November 2.
36) Dutta, R., Lee, C.-H., Odumabo, S., Ye, P., Walker, S.C., **Karpyn, Z.T.**, and Ayala H., L.F., 2012. "Quantification of fracturing fluid migration due to spontaneous imbibition in fractured tight formations". SPE Americas Unconventional Gas Resources, Pittsburgh, PA, June 5-7.
37) Li, X., and **Karpyn, Z.T.**, 2012. "Experimental investigation of carbon dioxide trapping due to capillary retention in saline aquifers". 4th International Conference on Porous Media & Annual Meeting of the International Society for Porous Media, Purdue University, West Lafayette, Indiana, May 14-16.
38) Tokan-Lawal, A., Wang, W., Prodanović, M., and **Karpyn, Z.T.**, 2012. "Tortuosity and relative permeability of microfractured formations". 4th International Conference on Porous Media & Annual Meeting of the International Society for Porous Media, Purdue University, West Lafayette, Indiana, May 14-16.
39) Klise, K., McKenna, S.A., **Karpyn, Z.T.**, and Celauro, J., 2012. "Modified invasion percolation models for multiphase processes". Research Symposia on Geophysical Properties and Processes, U.S. Department of Energy, Office of Basic Energy Sciences, Gaithersburg, Maryland, April 5-6.
40) Lee, C. -H., and **Karpyn, Z.T.**, 2010. "Dynamic visual monitoring of spontaneous imbibition in unsaturated fractured porous media". AGU Fall Meeting, San Francisco, CA, December 13-17.
41) **Karpyn, Z.T.**, and Lee, C. -H., 2010. "Imaging imbibition front evolution in fractured permeable media". Gordon Research Conference on Flow & Transport in Permeable Media, Bates College, Lewiston, ME, July 11-16.

42) **Karpyn, Z.T.**, Piri, M., Singh, G., and Landry, C. J., 2009. "Characterization of fluid micro-structures in porous media and their relation to wettability". AGU Fall Meeting, San Francisco, CA, December 14-18.
43) Landry, C. J., **Karpyn, Z.T.**, and Piri, M., 2009. "Quantification of immiscible fluid distribution of an oil-wet and water-wet bead pack imaged using x-ray computed microtomography". AGU Fall Meeting, San Francisco, CA, December 14-18.
44) Basbug, B., and **Karpyn, Z.T.**, 2008. "Determination of relative permeability and capillary pressure curves using an automated history matching approach". SPE Eastern Regional / AAPG Eastern Section Joint Meeting, Pittsburgh, PA, October 11-15.
45) Petchsingto, T., and **Karpyn, Z.T.**, 2007. "Characterization of fracture capillary pressure from geostatistical analysis of rough fracture structures". AGU Fall Meeting, San Francisco, CA, December 10-14.
46) **Karpyn, Z.T.**, and Piri, M., 2006. "Prediction of fluid occupancy in fractures using network modeling and X-ray microtomography". AGU Fall Meeting, San Francisco, California, December 11-15.
47) Petchsingto, T., and **Karpyn, Z.T.**, 2006. "Micromodel investigation of capillary pressures in a rough CT-scanned fracture". AGU Fall Meeting, San Francisco, CA, December 11-15.
48) Piri, M., and **Karpyn, Z.T.**, 2006. "Pore-scale network modeling of two-phase flow in a CT-scanned fracture", Gordon Research Conferences, Flow & Transport in Permeable Media, Andover, NH, July 30 - August 4.
49) **Karpyn, Z.T.**, Halleck, P.M., and Grader, A.S., 2006. "Fracture-matrix transport dominated by capillary-driven flow in layered sandstone". Paper presented at the Fifteenth SPE Improved Oil Recovery Symposium, Tulsa, OK, April 22-26.
50) **Karpyn, Z.T.**, Grader, A.S., and Halleck, P.M., 2005. "Quantitative visualization of fluid occupancy in a vertical fracture under static and dynamic flowing conditions". Proceedings, AGU Fall Meeting, San Francisco, CA, December 5-9.
51) Enunwa, C., Razzano Iii, J.L., Ramgulam, A., Flemings, P.B., Ertekin, T., and **Karpyn, Z.T.**, 2005. "Tahoe field case study - understanding reservoir compartmentalization in a channel-levee system", Gulf Coast Association of Geological Societies Annual Convention, New Orleans, LA, September 25-27.
52) Narzidoust, K., Ahmadi, G., **Karpyn Z.T.**, Grader, A.S., Halleck, P.M., Mazaheri, A., and Smith, D., 2005. "Gas-liquid flows through a rock fracture". Proceedings, ASME Fluid Engineering Summer Conference, Houston, TX, June 19-23.

International Symposia

53) **Karpyn, Z.T.**, 2023 "Experimental Investigation of Gas Storage in Ultra-tight Rocks," Jornada Anual de Medios Porosos del Capítulo Español, *Spain Interpore Chapter*, Barcelona, Spain, 20 Nov.
54) **Karpyn, Z.T.**, 2023 "Fostering research collaboration across international borders amidst cultural, regulatory and funding divergence," *Fulbright Mediterranean Research Seminar*, Alicante, Spain, 16-19 Nov.
55) **Karpyn, Z.T.**, Ayala, L.F., 2023 "Experimental and Computational Studies in Porous Media to Assist the Global Energy Transition Strategy," Graduate seminar series, School of Civil Engineering, *Universidad Politécnica de Madrid*, Spain, 25 Sept.
56) Lou, X., **Karpyn, Z. T.**, 2023 "Extraction of pore structure information in nanoporous media with sub-resolution porosity using X-ray nanotomography," Interpore 2023: 15th Annual International

Conference on Porous Media, Edinburgh, Scotland, 22-25 May.

57) **Karpyn, Z.** 2022 "Experimental Investigation of Conditions Favoring Enhanced Gas Storage in Shales," InterPore 2022 Conference, Khalifa University in Abu Dhabi, UAE, May 30-June 2 (invited)
58) Tawfik, M., Adishesha A., **Karpyn, Z.**, Huang, X., Shokouhi, P., and Johns, R., 2022 "Image-based Petrophysical Characterization of Porous Media: A Comparative Study of Common Deep-learning-based Denoising Algorithms," InterPore 2022 Conference, Khalifa University in Abu Dhabi, UAE, May 30-June 2.
59) Purswani, P., Johns, R., **Karpyn, Z.T.**, 2021. "Relationship Between Residual Saturations and Wettability Using Pore-network Modeling", SPE Annual Technical Conference and Exhibition, Denver, CO, October 5–7
60) **Karpyn, Z.,** 2021. "In-situ contact angle measurements and wettability alteration in porous media," GeoScience & GeoEnergy Webinar, hosted by TU Delft and Heriot-Watt University, February 4.
61) Purswani, P., Johns, R., **Karpyn, Z.T.**, Blunt, M., 2020. "Predictive Modeling of Relative Permeability using a Generalized Equation-of-State", SPE-200410-MS. SPE Annual Technical Conference and Exhibition, Virtual, October 27-29.
62) Tawfik, M., **Karpyn, Z.T.**, and Johns, R., 2020. "Effect of Oil Chemistry on the Performance of Chemically-tuned Waterflooding: An Integrated Experimental Approach", SPE-201670-MS. SPE Annual Technical Conference and Exhibition, Virtual, October 27-29.
63) Lou, X., Chakraborty, N., **Karpyn, Z.T.**, and Ayala, L., 2019. "Comparative analysis of gas-liquid diffusion in permeable media using lab-scale pressure decay data", Energí Simulation Summit, Calgary, Canada, October 3-5 (invited).
64) Lou, X., Chakraborty, N., **Karpyn, Z.T.**, Ayala, L., Nagarajan, N., and Wijaya, Z., 2019. "Experimental Study of Gas-Liquid Diffusion in Porous Rock and Bulk Fluids to Investigate the Effect of Rock Matrix Hindrance". SPE Annual Technical Conference and Exhibition, Calgary, *Canada*, September 30 – October 2.
65) Tawfik, M., **Karpyn, Z.T.**, and Johns, R., 2019. "Multiscale Study of Chemically-tuned Waterflooding in Carbonate Rocks using Micro-Computed Tomography", 20th European Symposium on Improved Oil Recovery, European Association of Geoscientists & Engineers, Le Palais Beaumont in Pau, *France*, April 8 – 11.
66) Chakraborty, N., **Karpyn, Z.T.**, Liu, S., and Yoon, H., 2018. "Confinement-induced phase densification in ultratight Marcellus shale", Energi Simulation (former Foundation CMG) Summit, Calgary, *Canada*, October 1-3.
67) **Karpyn, Z.T.**, 2018. "Experimental investigation of gas storage and transport in shales", Energi Simulation (former Foundation CMG) Summit, Calgary, *Canada*, October 1-3.
68) Enab, K., Ertekin, T., and **Karpyn, Z.T.**, 2018. "Artificial Neural Network Toolbox for CO2-WAG Injection Using Fishbone Well Design in Low Permeability Oil Reservoirs". Energi Simulation (former Foundation CMG) Summit, Calgary, *Canada*, October 1-3.
69) Purswani, P., Tawfik, M., **Karpyn, Z.T.**, and Johns, R., 2018. "On the Development of a Relative Permeability Equation of State". ECMOR XVI, Barcelona, *Spain*, September 3-6
70) Bansal, Y., Ertekin, T., and **Karpyn, Z.T.**, 2017. "Mapping Completion Design Trends in a Compartmentalized Tight Oil Reservoir for Rapid Evaluation Using Artificial Neural Networks". Abu Dhabi International Petroleum Exhibition and Conference (ADIPEC), Abu Dhabi, *United Arab Emirates*, November 13 – 16.

71) Purswani, P., and **Karpyn, Z.T.,** 2016. "Effect of brine composition on wettability alteration and oil recovery from oil-wet carbonate rocks". *Foundation CMG Summit*, Calgary, *Canada*, September 14-16.
72) **Karpyn, Z.T.,** and Purswani, P., 2016. "Experimental measurements of contact angles in porous media and its impact on sweep efficiency". Foundation CMG Summit, Calgary, *Canada*, September 14 – 16.
73) Chakraborty, N., and **Karpyn, Z.T.**, 2015. "Experimental investigation of effective gas permeability in ultra-tight shales". Foundation CMG Summit, Calgary, Canada, September 15-17.
74) **Karpyn, Z.T.**, 2014. "Fluid behavior and rock interactions – Fractured Rocks," Foundation CMG Summit, Calgary, *Canada*, September 24 – 26.
75) **Karpyn, Z.T.**, 2013. "Experimental investigation of shale gas production impairment due to spontaneous imbibition of fracturing fluid following wellbore stimulation". SIAM Conference on Mathematical and Computational Issues in the Geosciences, Padua, *Italy*, June 17 – 20.
76) Eide, Ø., Fernø, M., **Karpyn, Z.T.**, Haugen, Å., and Graue, A., 2013. "CO2 injections for enhanced oil recovery visualized with an industrial CT-scanner". 17th European Symposium on Improved Oil Recovery, European Association of Geoscientists & Engineers, Saint Petersburg, *Russia*, April 16 – 18.
77) Landry, C., and **Karpyn, Z.T.**, 2012. "4D x-ray computed microtomography imaging of oil/water/surfactant flow in a fractured porous medium and determination of fracture permeability by lattice Boltzmann modeling". Gordon Research Conference on Flow & Transport in Permeable Media, Les Diablerets, *Switzerland*, June 24 – 29.
78) Lee, C. -H., and **Karpyn, Z.T.**, 2010. "Experimental investigation of rate effects on two-phase flow through fractured rocks using x-ray computed tomography". GeoX 2010, 3rd International Workshop on X-Ray CT for Geomaterials, *New Orleans*, LA, March 1 – 3.
79) Prodanović, M., Bryant, S.L. and **Karpyn, Z.T.**, 2008. "Investigating matrix-fracture transfer via a level set method for drainage and imbibition". SPE Annual Technical Conference and Exhibition, *Denver*, CO, September 21 – 24.
80) Ertekin, T., Thararoop, P., **Karpyn, Z. T.**, and Gitman, A., 2007. "Integration of seismic attributes and production data in field development and planning". 17th Istanbul Technical University Petroleum and Natural Gas Seminar and Exhibition, Istanbul, *Turkey*, June7 – 8.
81) Basbug, B., and **Karpyn, Z.T.**, 2007. "Examination of porosity-permeability relationships using artificial neural networks". SPE Latin American and Caribbean Petroleum Engineering Conference, Buenos Aires, *Argentina*, April 15 – 18.

Invited Seminars and Workshops

82) "Experimental and Computational Studies in Porous Media to Assist the Global Energy Transition Strategy," Graduate seminar series, School of Civil Engineering, Universidad Politécnica de Madrid, Spain, 25 Sept.
83) "In-situ contact angle measurements and wettability alteration in porous media," Graduate seminar series, Mewbourne School of Petroleum & Geological Engineering, The University of Oklahoma, March 26, 2021
84) "Image-based analysis of gas densification and enhanced storage in nanoporus rocks," Chevron Energy Technology Company, February 4, 2020
85) "Mechanisms of gas storage in shale and implications for transport". Graduate Seminar Series, Harold Vance Department of Petroleum Engineering, Texas A&M University, February 26, 2019.

86) "Mechanisms of gas storage in shale and implications for transport". Graduate Seminar Series, School of Mines, Universidad Nacional de Colombia, Medellín, Colombia, March 7, 2019.
87) "Retos técnicos en el desarrollo de yacimientos no-convencionales: flujo de fluidos en rocas de ultra-baja permeabilidad". Grad/Undergrad Seminar, School of Mines, Universidad Nacional de Colombia, Medellín, Colombia, November 2, 2016.
88) "X-ray microtomography imaging of…lots-of-stuff". Graduate Seminar Series, Department of Applied Physics, EAFIT University, Medellín, Colombia, October 31, 2016.
89) "Technical challenges of unconventional shale oil and gas resources: fluid flow in ultra-low permeability rocks". Graduate Seminar Series, Department of Geosciences, EAFIT University, Medellín, Colombia, October 28, 2016.
90) "Technical challenges of unconventional shale oil and gas resources: fluid flow in ultra-low permeability rocks". Graduate Seminar Series, Department of Mechanical Engineering, Universidad de los Andes, Bogotá, Colombia, October 21, 2016.
91) "Metodología de la Investigación: Tomografía de rayos X aplicada a Ciencias e Ingeniería". Graduate Seminar, School of Mines, Universidad Nacional de Colombia, Medellín, Colombia, October 3, 2016.
92) "Experimental investigation of gas production impairment due to spontaneous imbibition of fracturing fluid". Graduate Seminar Series, Harold Vance Department of Petroleum Engineering, Texas A&M University, October 22-23, 2013.
93) "COMPASS: Communicating Complexity in a Rapidly Changing World: A Science Communication Workshop". Workshop sponsored by the Penn State Institutes for Energy and the Environment (PSIEE) and Earth and Environmental Systems Institute (EESI), September 26-27, 2013.
94) "Experimental investigation of conditions affecting wellbore cement integrity in geo-sequestration environments". Graduate Seminar Series, Department of Civil and Environmental Engineering, Lehigh University, May 15, 2013.
95) "Visualization of Natural and Synthetic Porous Materials". Millennium café seminar series, Materials Research Institute, The Pennsylvania State University, March 30, 2013.
96) "Experimental investigation of conditions affecting wellbore cement integrity in geo-sequestration environments". Graduate Seminar Series, Department of Civil and Environmental Engineering, The Pennsylvania State University, March 29, 2013.
97) "Geo-sequestration of carbon dioxide in saline aquifers: experiments on capillary trapping". Energy Exchange Seminar Series, EMS Energy Institute, The Pennsylvania State University. February 13, 2013.
98) "A Study of Predominant Flow Mechanisms and Parameters Controlling Contaminant Migration in Fractured Heterogeneous Rocks". NSF CMMI Research and Innovation Conference, Boston, MA, July 9-11, 2012.
99) "Image data analysis of fractured porous media". Workshop on Image Analysis for Porous Media, Department of Petroleum and Geosystems Engineering, The University of Texas at Austin, July 14-15, 2011.
100) "Spontaneous underground migration of water-based fracturing fluids used in shale gas reservoir stimulation," Upstream Shale Gas and Environmental Summit, Pittsburgh, Pennsylvania, September 29-30, 2010.
101) "Characterization of transport mechanisms in fractured porous media", Polymer Physics Seminar Series, Department of Materials Science and Engineering, The Pennsylvania State University, July 6, 2010.

102) "The devil is in the details: exploring transport mechanisms in fractured porous media using X-ray microtomography", Graduate Seminar Series, Department of Chemical & Biomolecular Engineering, University of Houston, September 29, 2009.
103) "The devil is in the details: exploring transport mechanisms in fractured rocks with X-ray microtomography", Graduate Seminar Series, Department of Chemical & Petroleum Engineering, University of Wyoming, April 22, 2009.
104) "Visualization of fluid transport in fractured rocks using X-ray Computed Tomography", Graduate Seminar Series, Department of Petroleum and Geosystems Engineering, The University of Texas at Austin, January 28, 2008.
105) Karpyn, Z.T., Chadee, W., Chang, H., Joslin, T. and Sprunt, E., "Experiences of women in the petroleum industry", Discussion Panel at the Annual Technical Conference and Exhibition, Dallas, Texas, October 9-12, 2005.

SUPERVISION OF RESEARCH

Supervised over 40 graduate students and post-doctoral scholars from 14 different countries, including Argentina, Brazil, Cuba, China, Egypt, France, India, Ivory Coast, Nigeria, Russia, Taiwan, Thailand, Turkey, USA and Venezuela.

Master's degree

1) Dong, Bingqiang, "Laboratory-scale testing of permanent carbon sequestration through accelerated geomineralization", MS, EME-PNG E. Expected graduation: Dec, 2023.
2) Niu, Fangya, "Effect of downhole pressure on CO2-brine contact angle during geologic carbon sequestration", MS, EME-PNG E. Granted: May, 2021.
3) Fan, Jiayi, "Characteristic pressure-production performance of retrograde condensate reservoirs: a laboratory-scale study", MS, EME-PNG E. Granted: December, 2020.
4) Lou, Xuanqing, "Experimental study of gas-liquid diffusion in porous rocks and bulk fluids", MS, EME-PNG E. Granted: August, 2019.
5) Kojadinovich, Gregory, "Tailoring brine composition for maximum oil recovery from oil-wet carbonate rocks", MS, EME-PNG E. Granted: August, 2018.
6) Purswani, Prakash, "Effect of brine composition on wettability alteration and oil recovery from oil-wet carbonate rocks", MS, EME-PNG E. Granted: December, 2017.
7) Zamponi, Renzo, "Comparative Study of Decline Curve Analysis Methods Using a Lab-scale Gas Reservoir", MS, EME-PNG E. Granted: August, 2016
8) Bonotto, Giancarlo "Integrating geophysical surveys and 3D X-ray computed tomography for improved mapping of subsurface gas", MS, EME-PNG E. Granted: August, 2016.
9) Zhang, Tianji, "Computational fluid dynamics and reactive transport of CO2-brine in a fractured cement core using X-ray micro-tomography data", MS, EME-PNG E. Granted: May, 2016.
10) Abdelmalek, Botros, "Pseudo-pressure type curve approach for permeability and porosity estimation from pressure-pulse decay data", MS, EME-PNG E. Granted: May, 2016.
11) Chakraborty, Nirjhor, "Impact of fracturing fluid soaking time on gas production from Marcellus shale cores – an experimental investigation", MS, EME-PNG E. Granted: December, 2015.
12) Pakoz, Ugur, "A comparative experimental study of displacement efficiencies of low-salinity waterflooding in oil-wet carbonate rocks", MS, EME-PNG E. Granted: December, 2015.
13) Konya, Samet, "Pore-scale multiphase flow in bead packs at various axial stress conditions", MS, EME-PNG E. Granted: August, 2015.
14) Aksu, Irem, "Swelling of clay minerals and its impact on permeability", MS, EME-PNG E. Granted: August, 2014.

15) Yeboa, Kojo, "Modeling the effects of salt precipitation and kinetic mineral reaction on well injectivity due to carbon dioxide injection in deep saline aquifers", MS, EME-PNG E. Granted: August, 2014.
16) Torrealba, Victor, "Pore-Scale investigation on stress-dependent characteristics of granular packs and their impact on multiphase fluid distribution", MS, EME-PNG E (IUG Program). Granted: May, 2014.
17) Yan, Qiyan, "Experimental investigation of shale gas production impairment due to fracturing fluid migration during shut-in time", MS, EME-PNG E. Granted: December, 2013.
18) Odumabo, Sijuola, "Investigation of gas flow hindrance due to fracturing fluid leak off in low permeability formations", MS, EME-PNG E. Granted: May, 2013.
19) Celauro, Josmar, "Pore-scale multiphase flow experiments in beads packs of variable wettability". Degree: MS, EME-PNG E. Granted: August, 2012.
20) Dutta, Riteja, "Quantification of fracturing fluid migration due to spontaneous imbibition in fractured tight formations". Degree: MS, EME-PNG E. Granted: August, 2012.
21) Larpudomlert, Ruthut, "Experimental investigation of immiscible flow in mixed-wet porous media using a pore-scale approach". Degree: MS, EME-PNG E. Granted: August, 2012.
22) Landry, Christopher, "Experimental pore-scale analysis of fluid interfacial areas in oil-wet and water-wet bead packs". Degree: MS, PME-PNG E. Granted: December, 2009.
23) Nago, Annick, "Multivariate production optimization of a natural gas field". Degree: MS, PME. Granted: May, 2009.
24) Krishnamurthy, Jayanth, "Engineering analysis of a natural gas gathering and production system for the determination of optimum operating conditions". Degree: MS, PNG E. Granted: December, 2008.
25) Thararoop, Prob, "A neural network approach to predict well performance in conjunction with infill drilling strategies". Degree: MS, PNG E. Granted: May, 2007.

Doctoral degree

26) Nwankwo, Ifeanyi, "Machine learning framework for petrophysical property estimation at the field scale" PhD, EME-PNG E. Expected graduation: August, 2026.
27) Gómez Méndez, Ianna, "Accelerated mineralization of CO2 in Basalt cores" PhD, EME Expected graduation: August, 2026.
28) Lou, Xuanqing, "Estimation of gas-liquid diffusion coefficients in tight rocks and shales and their correlation with pore network tortuosity", PhD, EME-PNG E. Granted: May, 2023.
29) Purswani, Prakash, "Relative permeability equation-of-state: The role of phase connectivity, wettability, and capillary number", PhD, EME-PNG E. Granted: May, 2021.
30) Tawfik, Miral, "Pore-scale analysis of wettability alteration in carbonate rocks and the effect of water salinity", PhD, EME-PNG E. Granted: December, 2020.
31) Zhou, Sandong, "Anisotropic properties in low to medium rank coalbed methane reservoirs", PhD, China University of Geosciences, Beijing. Granted: May, 2019.
32) Chakraborty, Nirjhor, "Fundamental investigation of gas storage and transport in shales", PhD, EME-PNG E. Granted: December, 2019.
33) Cao, Peilin, "Experimental investigation of conditions affecting wellbore integrity in geosequestration environments". Degree: PhD, EME-PNG E. Granted: May, 2014.
34) Li, Xinqian, "Geologic sequestration of CO2 by permanent capillary trapping and salt precipitation". Degree: PhD, EME-PNG E. Granted: May, 2014.

35) Alexis, Dennis, "Evaluation of fluid transport properties of coal bed methane reservoirs". Degree: PhD, PME-PNG E. Granted: August, 2013.
36) Aslan, Erhan, "Development and testing of an advanced coalbed methane numerical reservoir simulator". Degree: PhD, EME-PNG E. Granted: August, 2013.
37) Landry, Christopher, "Pore-scale imaging and Lattice Boltzmann modeling of single- and multi-phase flow in fractured and mixed-wet permeable media". Degree: PhD, EME-PNG E. Granted: May, 2013.
38) Bansal, Yogesh, "Forecasting the production performance of wells located in tight oil plays using artificial expert systems". Degree: PhD, PME-PNG E. Granted: May, 2012.
39) Lee, Chung-Hao, "Experimental investigation of the influence of fracture inclination on improved hydrocarbon recovery from fractured rocks". Degree: PhD, PME-PNG E. Granted: May, 2011.
40) Thararoop, Prob, "Development of a multi-mechanistic, dual-porosity, dual-permeability flow model for coalbed methane systems accounting for coal shrinkage and swelling effects". Degree: PhD, PME-PNG E. Granted: August, 2010.
41) Basbug, Basar, "Analysis of spontaneous imbibition in fractured, heterogeneous sandstone". Degree: PhD, PNG E. Granted: May, 2009.
42) Petchsingto, Tawatchai, "Numerical study of fracture aperture characteristics and their impact on single-phase flow and capillary-dominated displacement". Degree: PhD, PNG E. Granted: May, 2008.

Postdoctoral scholars

43) Purswani, Prakash, *Post-doctoral Fellow*, "Evaluation of Potential Technology Pathway to Image Rock Properties", (June 2021-December 2022).
44) Tunwal, Mohit, *Post-doctoral Fellow*, "Integrated geoscience and engineering approach to predicting scale breaks in sedimentary deposits", (February 2021-July 2022).
45) Cui, Jin, *Post-doctoral Fellow*, "Mechanisms of fluid transport in micro- and nano-scale pore networks in coal", (October 2019-October 2020).
46) Enab, Khaled, *Research assistant and laboratory supervisor*, (January 2018-July 2019).
47) Bazilevskaya, Ekaterina, *Research Associate and laboratory supervisor*, (July 2012-August 2014).
48) Peng, Ye, *Post-doctoral Fellow*, "Experimental investigation of well productivity hindrance due to fracking leakoff in tight sands and shale formations", (August-December 2011).
49) Lee, ChungHao, *Post-doctoral Fellow*, "Experimental investigation of well productivity hindrance due to fracking leakoff in tight sands and shale formations", (January 2011-December 2011).

SERVICE HISTORY

University Service

- *Strategic and Facilities Planning:*
    - *Member,* University Research Council (URC), (July, 2020-present). Governance body for research operations and strategies at Penn State, administered by the Senior Vice President for Research
    - *Member*, Advisory Committee for Graduate Education (July, 2020- present). Advisory group to the Graduate School
    - *Member,* Faculty Affairs Advisory Committee (FAAC), (July, 2022-2023). Advisory group to the vice provost for faculty affairs on faculty development, promotion and tenure, and other issues related to academic affairs.

- *Chair*, University Research Council (URC), (July, 2021-June, 2022). Governance body for research operations and strategies at Penn State, administered by the Senior Vice President for Research.
- *Member*, Core Committee for Hosler Renovation Feasibility Study, Office of Physical Plant, University Park Campus. 2018.
- *Chair*, EME Laboratories and Space Assessment Committee, Department of Energy and Mineral Engineering, 2017 – 2018.
- *Member*, Energy and Environmental Sustainability Laboratory (EESL) Advisory Board, Penn State Institutes for Energy and the Environment (IEE), 2015 – 2017.
- *College of Earth and Mineral Sciences (EMS) Representative*, Facilities Planning Advisory Board (FPAB), 2015 – 2017.
- *Member*, Strategic Planning Exploratory Committee, University Office of Global Programs (UOGP), 2013 – 2014.
- *Member*, Exciting Instrumentation for Energy and Environment Group, Penn State Institutes for Energy and the Environment (IEE), 2013.
- *Member*, Strategic Planning Committee, College of Earth and Mineral Science, 2013-2014.
- *Chair*, Strategic Planning Committee, EMS Energy Institute, 2013 – 2014.
- *Member*, Steering Committee for the Penn State Marcellus Center for Outreach and Research (M-COR), 2010 – 2012.
- *Member*, Executive Council, College of Earth and Mineral Science, 2013 – 2014.
- *Member*, Executive and Coordinating Council, Penn State Institutes for Energy and the Environment (IEE), 2013 – 2014.
- *Member*, Assessment Committee of Research Infrastructure, College of Earth and Mineral Sciences, 2009 – 2010.

- *Performance Evaluation, Promotion and Tenure:*
  - *Chair*, EMS Promotion and Tenure Committee, College of Earth and Mineral Sciences, 2019 – 2020.
  - *EME Representative*, EMS Promotion and Tenure Committee, College of Earth and Mineral Sciences, 2017 – 2020.
  - *Elected Chair/Member*, Faculty Activity Summary Analysis Committee. In charge of reviewing annual EME faculty activity reports and providing recommendation of salary increases to EME Department Head, 2013 – 2015.
  - *Elected Member*, Promotion and Tenure Committee, Energy and Mineral Engineering, 2013 – 2014.
- *Invited panelist*, Picture a Scientist, College of Earth and Mineral Sciences, 2021.
- *Coordinator*, Aspire Institutional Change initiative (IChange) Task Force, Office of the Vice Provost for Faculty Affairs, implement institutional assessment and change models to support the advancement of more inclusive and diverse STEM environments, 2019-2020.
- *Member*, West Indies Global Engagement Network (GEN) Coordinating Committee, University Office of Global Programs (UOGP), 2012-2014.
- *Faculty mentor*, Summer Research Opportunities Program (SROP), Penn State's Office of Graduate Educational Equity Programs works in partnership with the Committee on Institutional Cooperation (CIC) to design an eight-week research program to interest talented undergraduate students from underrepresented groups in academic careers, 2011.

- *Faculty coordinator,* Summer Experience in Earth and Mineral Sciences: SEEMS, summer research experience for high-school students from underrepresented groups, 2007-2010.

Professional service

- *Editorial boards:*
  - *Deputy Editor, GeoEnergy, 2022-present*
  - *Associate Editor,* Transport in Porous Media, 2018-present.
  - *Assistant Editor-in-Chief*, Journal of Petroleum Science and Engineering, 2014-2017.
  - *Associate Editor*, Society of Petroleum Engineers Editorial Review Committee, Society of Petroleum Engineers Journal, 2009-2014.
  - *Guest Editor*, Special issue of International Journal of Oil, Gas and Coal Technology, "Pore-Scale Flow and Transport Processes in Petroleum Reservoirs", 2010-2011.
  - *Technical Editor*, Society of Petroleum Engineers Editorial Review Committee, Reservoir Evaluation & Engineering Journal, 2005-2009.
- *Conference committee member,* organizing conferences:
  - *Member*, Program Committee – Reservoir Engineering, 2012 SPE Annual Technical Conference and Exhibition, San Antonio, Texas, October 8-10.
  - *Member*, Program Committee – Reservoir Engineering, 2011 SPE Annual Technical Conference and Exhibition, Denver, Colorado, October 30 – November 2.
  - *Member*, Technical Review Committee, GeoX 2010, 3rd International Workshop on X-Ray CT for Geomaterials, New Orleans, Louisiana, March 1-3.
  - *Member*, Technical Review Committee, 2010 SPE Eastern Regional Meeting, Morgantown, West Virginia, October 12-14.
  - *Co-Chair*, Program Committee, 2008 Joint AAPG–SPE Eastern Meeting – Conference and Exhibition, Pittsburgh, Pennsylvania, October 11-15.
  - *Member*, Technical Review Committee, 2007 SPE Latin American & Caribbean Petroleum Engineering Conference, Buenos Aires, Argentina, April 15-18.
  - *Session Chair*, 2007 SPE Latin American & Caribbean Petroleum Engineering Conference, Buenos Aires, Argentina, April 15-18.
- *Technical reviewer of research grants:*
  - Early Career Research Program, Office of Science, U.S. Department of Energy, 2015, 2017.
  - Natural Sciences and Engineering Research Council of Canada (NSERC), 2014, 2016.
  - Technology Foundation STW, The Netherlands, 2015.
  - Earth Sciences (EAR) – Hydrologic Sciences, National Science Foundation, 2015.
  - Office of Basic Energy Sciences (BES), U.S. Department of Energy, 2011, 2013, 2014.
  - The Petroleum Research Fund, New Directions Proposal, American Chemical Society (ACS-PRF ND), 2011, 2013, and 2014.
  - Faculty Early Career Development (CAREER) Program, National Science Foundation, 2012.
  - The Petroleum Research Fund, Doctoral New Investigator Proposal, American Chemical Society (ACS-PRF DNI), 2008.

- Faculty Advisor, Penn State Student Chapter of the Society of Petroleum Engineers, 2003 – 2009.
- *Member of professional and learned societies*
    - *Society of Core Analysts (SCA). 2005-present.*
    - *American Geophysical Union (AGU). 2003-present.*
    - *Society of Petroleum Engineers (SPE). 1999-present.*
    - *American Association for the Advancement of Science (AAAS). 2020-present.*
    - *InterPore-Spain chapter. 2023-present.*