Exponent®
Engineering & Scientific Consulting

Christopher Brock, Ph.D.

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Professional Profile

Dr. Brock draws on his expertise in chemical engineering, fluid mechanics, interfacial science, and thermodynamics to navigate a wide range of engineering challenges by applying both experimental and computational methods.

Prior to joining Exponent as an Associate in the Thermal Sciences Practice, Dr. Brock completed his Ph.D. at the Colorado School of Mines Center for Hydrate Research. His research focused on the development and application of a novel model for the formation kinetics and transportability of gas hydrates in the context of oil and gas multiphase flow, as well as conducting experiments at a variety of scales to understand the mechanics of the hydrate/solid interface. The products of these research efforts were used to inform industry partners for experimental field trials as well as offer retrospective insights into past hydrate plugging events. The research bolstered his expertise in computational model development and application, phase change kinetics, multiphase flow, interfacial science, and high-pressure flammable gas processes.

Industry and national laboratory internships have furthered Dr. Brock's practical experiences in diverse settings. As an engineering intern with Oxy, he performed a variety of field and laboratory tests to assess solutions to both a water chemistry scenario and a liquid/liquid separation process, as well as perform engineering economic analyses. During his time at Sandia National Laboratories, he developed a set of Python tools to perform predictive calculations integrated with experimental data analysis for electrical component reliability characterization.

Academic Credentials & Professional Honors

Ph.D., Chemical Engineering, Colorado School of Mines, 2025

M.S., Chemical Engineering, Colorado School of Mines, 2020

B.S., Chemical Engineering, University of New Mexico, 2019

Tau Beta Pi Engineering Honor Society

Prior Experience

Graduate Research Assistant, Center for Hydrate Research, 2021-2025

Engineering Intern – Water Strategy, Oxy, 2023

R&D Engineering Intern – Sandia National Laboratories, 2017-2021

Professional Affiliations

National Fire Protection Association – NFPA

National Association of Fire Investigators - NAFI

Society of Petroleum Engineers – SPE

American Institute of Chemical Engineers – AIChE

Languages

German

Publications

Brock C, Zerpa LE, Sloan ED, Koh CA. The impact of gas hydrate critical shear stress, deposition, and sloughing on multiphase flow pressure drop: simulating field experiments with a transient hydrate kinetics and transportability model. Energy Fuels 2025.

Brock C, Estanga D, Sun H, Koh CA. Cohesive and adhesive failure mechanisms of CO2/Tetrahydrofuran structure II gas hydrate crystalline cores through hydraulic yield strength measurements. Langmuir 2025; 41(16):10145–10151.

Brock C, Estanga D, Turner DJ, Hatscher S, Ugueto L, Zerpa LE, Sloan ED, Koh CA. Development and field application of a flow pattern dependent gas hydrate kinetics and transportability model for transient multiphase flow. Energy Fuels 2025; 39(11):5188–5198.

Brock C, Chase B, Estanga D, Sun H, Koh CA. Clathrate hydrate-solid surface adhesive shear strength measurements on carbon steel surfaces. Langmuir 2024; 40(27):13912–13919.

Presentations

Brock C, Zerpa LE, Delgado-Linares J, Koh CA. Integration of multiscale experimental workflow with transient hydrate kinetics & transportability simulator. Presented to Wintershall DEA, Stavanger, Norway, July 2024.

Brock C, Estanga D, Sun H, Koh CA. Hydraulic yield strength measurements of CO2 gas hydrate. Twenty-Second Symposium on Thermophysical Properties, Boulder, Colorado, USA, June 2024.

Brock C, Koh CA, Zerpa LE, Sloan ED. Modeling gas hydrate kinetics and plugging phenomena in transient systems with free water. Flow Assurance Technology Symposium 2024, Dhahran, Saudi Arabia, February 2024.

Brock C, Chase B, Estanga D, Sun H, Koh CA. Clathrate hydrate-solid surface adhesive shear strength measurements in a pipe geometry: an industrial perspective. International Conference on Gas Hydrates 10, Abstract # 718, Singapore, Singapore, July 2023.

Brock C, Pickarts M, Ravichandran S, Grasso G, Turner D, Estanga D, Zerpa LE, Sloan ED, Koh CAA. Transient hydrate formation and plugging model for segregated systems with variable geometry. International Conference on Gas Hydrates 10, Abstract #381, Singapore, Singapore, July 2023.

Brock C, Pickarts M, Afra S, Turner D, Grasso G, Delgado-Linares J, Zerpa LE, Koh CA. Plugging risks and mechanisms scale-up part I: benchtop to pilot-scale flowloop. International Conference on Gas Hydrates 10, Abstract #292, Singapore, Singapore, July 2023.