Stanford

Laura Frouté

Postdoctoral Scholar, Energy Science and Engineering

Bio

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Vice President, Society of Petroleum Engineers (SPE), Stanford Student Chapter (2019 - 2020)

STANFORD ADVISORS

- Anthony Kovscek, Postdoctoral Faculty Sponsor

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Laura is a postdoctoral scholar at Stanford University, working on subsurface engineering solutions for the energy transition. Part of her research focuses on replicating geological hydrogen production in the laboratory and identifying and mitigating reactivity constraints at the microscale. Her research also focuses on investigating carbon storage into various basalt formations by measuring their carbon mineralization potential. Her expertise includes designing laboratory-scale pilots and conducting research on rock formations in the context of hydrocarbon production, carbon storage, and hydrogen production to understand the interplay of geochemistry, reaction mechanisms and complex storage and transport processes across length scales. To study the evolution of porous media properties following reaction or transport experiments, she uses a wide spectrum of multiscale, multimodal material characterization techniques (sorption, XRD, XRF, µCT, FIB-SEM, TEM). She holds a MS in Chemical Engineering from ENSIC (France) and a PhD in Energy Science and Engineering from Stanford University. Her interests range from subsurface engineering, fluid flow in porous media, to environmental and regulatory issues in the oil & gas industry, CCUS, climate solutions and energy policy.

Publications

PUBLICATIONS

- **Image processing and segmentation open source codes applied to FIB-SEM images of ultra-tight gas shales samples: Enhanced pore space representativeness and mineral identification** *GAS SCIENCE AND ENGINEERING*
  Lasnel, R., Froute, L., Kovscek, A. R., Jolivet, I. C., Creux, P.
  2025; 138

- **Hydrogen Generation and Serpentinization of Olivine Under Flow Conditions** *GEOPHYSICAL RESEARCH LETTERS*
  Ross, C. M., Vega, B., Froute, L., Kim, T., Kovscek, A. R.
  2025; 52 (6)

- **Identification of Vaca Muerta shale microlithofacies using convolutional neural networks with characterization by electron microscopy** *GAS SCIENCE AND ENGINEERING*
  Froute, L., Nazarova, M., Jolivet, I. C., Creux, P., Chaput, E., Kovscek, A. R.
  2025; 134

- **Scale translation yields insights into gas adsorption under nanoconfinement** *PHYSICS OF FLUIDS*
  Liu, L., Froute, L., Kovscek, A. R., Aryana, S. A.
  2024; 36 (7)
- **Evaluation of Electron Tomography Capabilities for Shale Imaging.** *Microscopy and microanalysis : the official journal of Microscopy Society of America, Microbeam Analysis Society, Microscopical Society of Canada*
  Frouté, L., Boigné, E., Jolivet, I. C., Chaput, E., Creux, P., Ihme, M., Kovscek, A. R.
  2023
- **Micro X-ray fluorescence reveals pore space details and spatially-resolved porosity of rock-based microfluidic devices.** *Lab on a chip*
  Froute, L., Guan, K. M., Yun, W., Lewis, S. J., Stripe, B. D., Yang, X., Lapene, A., Kovscek, A. R., Creux, P.
  2023
- **Environmental impact of solution pH on the formation and migration of iron colloids in deep subsurface energy systems.** *The Science of the total environment*
  Spielman-Sun, E., Bland, G., Wielinski, J., Frouté, L., Kovscek, A. R., Lowry, G. V., Bargar, J. R., Noël, V.
  2023: 166409
- **Multimodal study of the impact of stimulation pH on shale pore structure, with an emphasis on organics behavior in alkaline environments** *FUEL*
  Medina-Rodriguez, B. X., Frout, L., Alvarado, V., Kovscek, A. R.
  2023; 331
- **Transport Simulations on Scanning Transmission Electron Microscope Images of Nanoporous Shale** *ENERGIES*
  Froute, L., Wang, Y., McKinzie, J., Aryana, S. A., Kovscek, A. R.
  2020; 13 (24)
- **Determination of thermophysical properties of cyclopentane hydrate using a stirred calorimetric cell** *JOURNAL OF CHEMICAL THERMODYNAMICS*
  Delroisse, H., Plantier, F., Marlin, L., Dicharry, C., Froute, L., Andre, R., Torre, J.
  2018; 125: 136–41