

Rebecca J Brenneis

Email: rzb@mit.edu

EDUCATION

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, MA

PhD in Civil and Environmental Engineering

July 2024

Dissertation Title: Novel Earth Abundant Catalytic Materials for Abatement of Atmospheric Methane Sources, and Evaluation of Agricultural Deployment Environments

Thesis Advisor: Desiree L. Plata

YALE UNIVERSITY, New Haven, CT

2018

MS in Chemical and Environmental Engineering

Thesis Advisor: Desiree L. Plata

GEORGE MASON UNIVERSITY, Fairfax, VA

2015

BS in Earth Science with a minor in Environmental Engineering, Summa Cum Laude

LONG ISLAND UNIVERSITY, GLOBAL COLLEGE, Brooklyn, NY

2010

BA in Global Studies with a concentration in Media Studies

Independent Study (non-research): Worked as a staff journalist and freelance features writer for a daily publications while on study abroad (Egypt, India, China) for academic credit

AWARDS AND HONORS

- Theresa and Dennis M. Rohan Fellowship Fund 2016, 2017
- OSCAR Student Excellence Award Nominee 2015
- OSCAR Undergraduate Research Scholar Grant Recipient 2014, 2015
- Hardy Cross Oratory Topic Presenter 2015
- Marr Technical Paper Participant 2015
- Volgenau School of Engineering Dean's Scholarship 2014, 2015
- George Mason University Dean's List 2014, 2015
- Golden Key International Honor Society 2014, 2015
- Honored Invitee, in recognition of journalistic excellence on issues of gender discrimination, *The Asian's Women's Human Rights Council's High Court on Dowry and Related Forms of Violence against Women in India.* 2009

PUBLICATIONS

Brenneis, R.J.; Johnson, E.P.; Shi, W.; Plata, D.L. Atmospheric- and Low-Level Methane Abatement via an Earth-Abundant Catalyst *ACS Environmental Au* **2022** 2 (3) 223-231 DOI: 10.1021/acsenvironau.1c00034

Sawyer, W.J.; Genina, I.; **Brenneis, R.J.;** Feng, H.; Li, Y.; Luo, X.L.L. Methane Emissions and Global Warming: Mitigation Technologies, Policy Ambitions, and Global Efforts *MIT Sci. Policy Rev.* **2022** (3) 73-84 DOI: 10.38105/spr.8u4spgvc0e

Li, Y.; Thelemaque, N.A.; Siegel, H.G.; Clark, C.J.; Ryan, E.C.; **Brenneis, R.J.;** Gutchess, K.M.; Soriano Jr., M.A.; Xiong, B.; Deziel, N.C.; Sainers, J.E.; Plata, D.L. Groundwater Methane in Northeastern Pennsylvania Attributable to Thermogenic Sources and Hydrogeomorphologic Migration Pathways *Environmental Science and Technology* **2021** 55 (24) 16413-16422 DOI: 10.1021/acs.est.1c05272

Drollette, B.; **Brenneis, R.J.;** Plata, D.L. Oligomer-Specific, Short Chain Linear Alcohol Ethoxylate Quantification via Comprehensive Two-Dimensional Gas Chromatography *Environmental Science and Technology Letters* **2018** 5 (9), 539-545 DOI: 10.1021/acs.estlett.8b00358

Shapiro, A.M.; **Brenneis, R.J.** Variability of Organic Carbon Content and the Retention and Release of Trichloroethene in the Rock Matrix of a Mudstone Aquifer *Journal of Contaminant Hydrology* **2018** 217, 32-42 DOI: 10.1016/j.jconhyd.2018.09.001

Clark, C.J., Xiong, B., Soriano Jr, M.A., Gutchess, K., Siegel, H.G., Ryan, E.C., Johnson, N.P., Cassell, K., Elliott, E.G., Li, Y., Cox, A.J., Bugher, N., Glist, L., **Brenneis, R.J.**, Sorrentino, K.M., Plano, J., Ma, X., Warren, J.L., Plata, D.L., Sayers, J.E., Deziel, N.C. Assessing Unconventional Oil and Gas Exposure in the Appalachian Basin: Comparison of Exposure Surrogates and Residential Drinking Water Measurements. *Environmental Science and Technology* **2022** 56 (2) 1091-1103 DOI: 10.1021/acs.est.1c05081

Xiong, B., Soriano, M.A., Gutchess, K.M., Hoffman, N., Clark, C.J., Siegel, H.G., De Vera, G.A., Li, Y., **Brenneis, R.J.**, Cox, A.J., Ryan, E.C., Sumner, A.J., Deziel, N.C., Sayers, J.E., Plata, D.L. Groundwaters in Northeastern Pennsylvania near intense hydraulic fracturing activities exhibit few organic chemical impacts. *Environmental Science: Processes & Impacts* **2022** 24 (2) 252-264 DOI: 10.1039/D1EM00124H

PRESENTATIONS

Brenneis, R.J.; Johnson, E.P.; Shi, W.; Plata, D.L. "Atmospheric- and Low-Level Methane Abatement via Copper Zeolites." Materials Research Society (MRS) Conference, Boston, MA, Dec 1, **2021**. Talk.

RESEARCH EXPERIENCE

MIT DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING, Cambridge, MA 2018 – Present
Doctoral Candidate

- Synthesized and analyzed the efficacy of copper zeolite catalysts for abatement of low-level methane
- Designed and implemented catalytic reactor and catalyst synthesis procedures
- Assessed the potential for catalyst points of failure and identified control conditions to eliminate them
- Performed field work measuring methane concentrations to assess the potential for catalyst deployment in agricultural settings with industrial partners

YALE UNIVERSITY DEPARTMENT OF ENVIRONMENTAL AND CHEM ENGINEERING, New Haven, CT 2016 – 2018
Graduate Research Assistant

- Analyzed chemical samples of produced water from hydrofracturing projects for organics and inorganics
- Preparing, organizing, processing and otherwise operating an analytical chemistry lab, in support of field work

UNITED STATES GEOLOGICAL SURVEY, NATIONAL RESEARCH PROGRAM, Reston, VA 2014 - 2016
Federal Pathways Intern of Research Hydrology with Dr. Allen Shapiro

- Analyzed and modeled Trichloroethene (TCE) transport and sorption in fractured sedimentary bedrock
- Participated in field work using techniques such as hydraulic tomography at groundwater contamination site
- Performed mineralogical analysis via X-Ray Diffraction
- Regularly processed soil and water samples using a variety of USGS regulatory procedures

PATENTS

Plata, D.L.; **Brenneis, R.J.** *Abatement of Low-Level Methane Through the Use of Catalytic, Earth-Abundant Materials*. (Filed May 19, 2022). US Application number 18/562,120. Patent Pending.

Hart, A.; Plata, D.L.; **Brenneis, R.J.**; Henry, A.; Pishahang, M.; Zhu, Q. *Catalytic Oxidation Reactors for the Removal of Low-Level Methane in Air*. (Filed October 13, 2022) US Application number 63/415,821. Patent Pending.

MEDIA COVERAGE

Wall Street Journal 2022

<https://www.wsj.com/articles/cat-litter-could-be-antidote-for-climate-change-researchers-say-11652490018>

Wired 2022

<https://www.wired.com/story/it-might-be-time-to-take-methane-removal-seriously/>

MIT News 2022

<https://news.mit.edu/2022/dirt-cheap-solution-common-clay-materials-may-help-curb-methane-emissions>

PBS NOVA 2021

<https://www.wired.com/story/it-might-be-time-to-take-methane-removal-seriously/>