

CEI Interdisciplinary Seminar Series:

Marine Carbon Dioxide Removal Powered by Photochemistry to Avoid the Worst Effects of Climate Change

Every serious plan to keep global temperatures below dangerous limits requires the active removal of billions of tons of CO₂ per year starting in the early 2030s, in addition to steep emission reductions. Yet there is a giant gap between this pressing need and existing carbon removal capabilities, which are costly, energy intensive, and that currently have a combined capacity that is 4 orders of magnitude too small. As the largest reservoir of readily exchangeable carbon on the earth's surface, the ocean plays a commanding role in global climate and is likely to be an integral part of future carbon removal solutions. I will present how ocean chemistry is intimately linked to evaluating the efficacy, scalability, and verification of carbon removal solutions.

As an example of both the promise and challenges of marine carbon removal, I will highlight one carbon removal solution that was developed by Oceanography faculty Julian Sachs and me. We use photochemistry and a class of small organic molecules called reversible photoacids as part of a low-energy method for extracting CO₂ from the environment. Our ten-person company, Banyu Carbon has its headquarters and labs in Fluke Hall on the UW campus. We have raised \$8.5M in venture funding and secured a \$500k carbon credit prepurchase with a set of first customers.

I am excited to share the experience of moving this innovation from the lab into the world, the challenge of building solutions to reach climate-relevant scales, and my conviction that academic entrepreneurs are uniquely suited to guide the translation of scientific research to solutions that can have a positive impact at planetary scales.



Alex Gagnon

Associate Professor, Oceanography, University of Washington,
Co-founder and CEO, Banyu Carbon

For accessibility questions, please contact event contact event coordinator, Danica Hendrickson, danicah@uw.edu

Seminar

Thurs, Nov 6, 2025

4:00 – 5:00 PM

NAN 181

Open to public

Coffee & Career Chat

Thurs, Nov 6, 2025

9:30 -10:30 AM

NAN 291

Open to all UW Grad Students

About the Speaker:

Dr. Alexander C. Gagnon is an Associate Professor of Chemical Oceanography at the University of Washington. He studies the mechanisms that control the skeletal growth and climate proxies in coral and plankton. His lab combines geochemical and materials science tools, like NanoSIMS and stable isotopes, with cultured marine organisms. Alex has undergraduate degrees in chemistry and molecular biology. He received a Ph.D. in Chemistry from Caltech and he completed a postdoc at the Department of Energy's Lawrence Berkeley National Lab. He is an NSF CAREER awardee and Kavli Fellow. Dr. Gagnon also leads several efforts to evaluate, develop, and commercialize ocean-based carbon removal technologies. He was awarded an Activate Fellowship, which provides entrepreneurial training for scientists that are developing hardware technology in the climate, materials science, and defense sectors.