Canadian Association of Physicists
Association canadienne des physiciens et physiciennes

Contribution ID: **4105** Type: **Oral (Non-Student) / Orale (non-étudiant(e))**

Materials physics in ocean-based carbon dioxide removal strategies

Tuesday 28 May 2024 15:00 (15 minutes)

There is a critical knowledge gap in understanding the kinetics and mechanisms of mineral formation and degradation in the context of potential technologies that are targeted for carbon capture, utilization, and storage [1]. Both crystallization and dissolution of carbonate minerals figure prominently in many such climate-change-mitigation strategies that aim for carbon dioxide removal. For example, different approaches to ocean-based alkalinity enhancement involve processes that depend on mineral surface and interfacial effects in order to increase water pH with concomitant atmospheric carbon removal. In this context, I will describe my team's work related to tracking changes in carbonate mineral phases, including surfaces and bulk structures, due to dissolution and recrystallization processes [2]. In doing so, I will emphasize the urgent need for collaborations between researchers who do foundational materials physics with those involved in developing monitoring, reporting, and verification protocols for potential carbon dioxide removal strategies.

[1] Basic Energy Sciences Roundtable, *Foundational Science for Carbon Dioxide Removal Technologies,* US Department of Energy (2022) DOI: 10.2172/1868525

[2] B. Gao, K. M. Poduska, S. Kababya, A. Schmidt. *J. Am. Chem. Soc.* (2023) 48, 25938-25941. DOI: 10.1021/jacs.3c09027

Keyword-1

carbon-based materials

Keyword-2

surface science

Keyword-3

carbon dioxide removal

Author: PODUSKA, Kristin

Presenter: PODUSKA, Kristin

Session Classification: (DCMMP) T2-7 Material Properties | Propriétés des matériaux (DPMCM)

Track Classification: Technical Sessions / Sessions techniques: Condensed Matter and Materials Physics / Physique de la matière condensée et matériaux (DCMMP-DPMCM)