Ph.D. Departmental Seminar – CHEM 6003

Sachel Christian-Robinson

Department of Chemistry

Supervisor: Dr. Francesca Kerton

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The Softer Side of Calcite: A Bio-derived Material from Blue Mussel Shell

Abstract

The rising population and the global shift in diets to incorporate more seafood-based products have caused the aquaculture industry to become a major player in targeting the United Nation's Sustainable Development Goal of Zero Hunger (UN SDG 2). However, as the demand for seafood products rises, increases in waste generation are anticipated. In mollusc farming, for example, the predominant by-product is shell, which is comprised almost entirely of calcium carbonate. Utilizing these biogenic calcium carbonate would steer waste away from landfills and the ocean, minimizing the environmental impact on land and aquatic ecosystems, thus addressing UN SDG 14 and 15, which target life below water and life on land. Fundamentally, this would be an effective strategy to remove waste from the aquaculture industry and advance towards closing the loop in the circular economy.[1]

Biogenic calcium carbonate from blue mussel (*Mytilus edulis*) shells farmed in Newfoundland and Labrador has been explored in several ways, including as a source for nacre

and a raw material for the synthesis of calcium acetate salt, which has shown promise as a de-icer.[2,3] This presentation will describe new uses of a 'soft' calcite material,[4] with possible applications as an adsorbent, catalyst, and energy storage material.[5,6]

References

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(4) Murphy, J. N.; Schneider, C. M.; Hawboldt, K.; Kerton, F. M. Hard to Soft: Biogenic Absorbent Sponge-like Material from Waste Mussel Shells. *Matter* **2020**, *3* (6), 2029–2041. https://doi.org/10.1016/j.matt.2020.09.022.

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(6) Christian-Robinson, S.; Kong, F.; Easton, E. B.; Kerton, F. M. Modification of Calcium Carbonate from Blue Mussel Shells with Copper Oxide Nanoparticles. *RSC Sustain.* **2025**, *3* (7), 3009–3018. https://doi.org/10.1039/D5SU00188A.