



GEOGULF2021

A U S T I N
October 27–29, 2021



Symbiotic Systems for Passive Seawater Mineral Extraction

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ABSTRACT

With the increased energy and electronic product demands of the 21st century, the limited terrestrial supply of critical minerals is expected to cause shortages—likely within our lifetime. Fortunately, supplies of many valuable minerals are greater in seawater than on land. Current efforts to extract minerals from the oceans focus on mining their solid forms from the seabed. This approach, however, is extremely challenging, cost prohibitive, and immensely destabilizing to ecosystems. This presentation will discuss how chemical adsorbents can be used to passively extract minerals from seawater, starting with a case of uranium for nuclear fuel. Symbiotic systems that integrate a mineral harvester with an existing offshore wind turbine have been shown to increase efficiency, reduce environmental impact, and decrease mineral production cost. This talk will describe the foregoing, and also present some promising initial work applying these design tools to minerals that are key to large-scale lithium-ion battery production, such as cobalt and lithium.

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