



Rensselaer

The HOWARD P. ISERMANN
DEPARTMENT OF CHEMICAL AND
BIOLOGICAL ENGINEERING

CBE Seminar Series – Spring 2023

Dr. Samantha McBride

Presidential Postdoctoral Research Fellow
Princeton University

Seminar: Wednesday, February 15, 2023
9:30 a.m. (Ricketts 203)

“Designing Interfacial Phenomena for Water, Energy, and Sustainability”

Abstract:

Solid/water interfacial phenomena are pervasive in both natural and built environments. Heat exchangers, membrane pores, and packed bed reactors are all examples of solid/water interfaces where interfacial phenomena and small-scale fluid physics can have outsized influences on process efficacy and sustainability. Even innocuous surfaces such as reactor walls are not inert and can actively interact with aqueous solutions and thereby create inefficiencies. Surface properties are crucial in controlling and reducing such inefficiencies. New tools and techniques in the fields of micro/nano-fabrication, thin film deposition, and soft matter physics have enabled unprecedented capability to manufacture engineered interfaces. By precisely designing the composition, chemistry, and microscopic geometry of interfaces, it is possible to go beyond simply selecting the best available material for a given application. Instead, we can specifically design surfaces and processes for fine-tuned control over interfacial phenomena to achieve drastic reduction, or even complete elimination, of inefficiencies. Here, three examples in which interfacial engineering can enable new paradigms for water, energy, and sustainability will be presented. I will show that composite liquid/solid surface can eliminate mineral fouling for improved material resilience, that nano-engineered materials can induce ejection of foulant crystals with potential application for heat transfer and waste brine management, and that multiphase microfluidics with controlled pore geometries can enable new separation processes.

Biography:



Dr. Samantha McBride is a Presidential Postdoctoral Research Fellow at Princeton University. Her research leverages the latest advancements in the fields of interfacial science, fluid physics, and soft matter physics for applications in water, energy, and sustainability. She earned her PhD in mechanical engineering at the Massachusetts Institute of Technology in 2020, where she was awarded a Martin Sustainability Fellowship and an NSF Graduate Research Fellowship. She also holds an MS in chemical engineering from Rensselaer Polytechnic Institute and a BS in environmental engineering from the University of Nevada, Reno. She is the recipient of the American Physical Society Division of Fluid Dynamics Milton van Dyke Award, the American Society for Gravitational and Space Research Orr-Reynolds Distinguished Service Award, the Meredith Kamm Memorial Award for excellence in graduate studies, and a Mistletoe Research Fellowship.

Refreshments will be available at 9:00 a.m. in the Ricketts Coonley Lounge (RI 120).

For more information, please contact Lisa Martin (swishl@rpi.edu)