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Small Fluids Technologies for the Largest Fluids Challenge: CO2 Utilization and CO2 Conversion

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ABSTRACT:

Controlling anthropogenic CO2 emissions is the world's most large-scale fluids challenge. The world's smallest fluids technologies have an important role to play in informing industrial scale CO2 utilization and conversion. In the area of utilization, I will outline first our group's development of microfluidic technologies to understand the most established CO2 utilization strategies in current energy operations - services now offered commercially in the oil and gas sector. In the area of CO2 conversion, I will describe our work in electrocatalytic CO2 conversion employing nanoscale catalysts, microscale transport, and large scale electrolyzer systems. We are focused on the efficient electroproduction of multi-carbon products ethylene, ethanol, and propanol from CO2 and renewable electricity. Our recent achievements will be highlighted along with our learnings from the development of the CERT Systems pilot plant, a finalist in the 2020 Carbon XPRIZE competition.

BIOGRAPHY:

David Sinton is a Professor in the Department of Mechanical & Industrial Engineering at the University of Toronto. He is the Canada Research Chair (Tier 1) in Microfluidics and Energy. The Sinton group develops fluid systems for applications in energy. The group is application-driven and is developing fluid systems to produce renewable fuels from CO2. The Sinton group previously developed a library of industrial fluid testing systems to improve chemical performance in the energy industry, now commercialized through the startup Interface Fluidics Ltd. Prof. Sinton was selected to be an NSERC E.W.R. Steacie Memorial Fellow in 2016. He is also a Fellow of the Canadian Society for Mechanical Engineering, a Fellow of the American Society of Mechanical Engineers, a Fellow of the Engineering Institute of Canada, a Fellow of the American Association for the Advancement of Science, and a Fellow of the Canadian Academy of Engineering.