



CAMBRIDGE CARES CAMBRIDGE CENTRE
FOR ADVANCED RESEARCH AND
EDUCATION IN SINGAPORE LTD.

CARES Visiting Scientist Seminar Series:

**Magnetic Resonance Imaging as a tool for probing flow, chemistry, and
molecular transport within chemical reactors**

Scott Elgersma, PhD candidate, University of Cambridge

Thursday 12 January 2023, 4pm - 5:30pm

Pinnacle Room, Level 16, CREATE Tower



Cambridge Centre for
Carbon Reduction in
Chemical Technology

Abstract: Despite the widespread use of multiphase catalytic reactors in numerous process industries, few experimental methods are available for making non-invasive measurements within them. Recent developments in Magnetic Resonance (MR) methodologies have transformed the ability to make operando measurements of flow, molecular diffusion, adsorption, and chemical conversion in multi-phase catalytic reactors. Using Magnetic Resonance Imaging (MRI), measurements can be spatially resolved, allowing flow, transport, and reaction to be mapped within an operating reactor. These measurements give an unprecedented insight into the processes occurring within these complex systems.

Ongoing work at the Magnetic Resonance Research Centre (University of Cambridge) seeks to develop state-of-the-art MRI techniques to advance the rational design of both catalyst and reactor technologies. This talk will outline the development and application of MR techniques for quantitatively probing flow and transport within packed bed reactors at industrially relevant conditions. Further, the insights these measurements give for the design of catalyst and reactor technology will be discussed.



Biography: Scott Elgersma is a final-year PhD student in chemical engineering working under the supervision of Prof Dame Lynn Gladden at the University of Cambridge. His research involves the development and application of magnetic resonance imaging (MRI) methods for operando measurements of mass transport and reaction within chemical reactors. The unique measurement capabilities of MRI enable the study of catalyst pellets at commercially relevant operating conditions. Such measurements provide fundamental reactor engineering insight, and ultimately promise to advance the reactor and catalyst technology used in heterogeneously catalysed processes. Originally from Alberta, Canada, Scott received his BSc. in chemical engineering from the University of Alberta, during which time he completed multiple internships in the chemical and energy industry.

CREATE

Campus for Research Excellence And Technological Enterprise

University of Cambridge
Nanyang Technological University
National University of Singapore