

Liquid-Liquid Encapsulation: A game-changing Technology

Date: 26 August 2025 (Tuesday)
Time: 2:30pm-4:00pm
Venue: HKIAS Lecture Theatre,
LG/F, Academic Exchange Building
City University of Hong Kong

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Abstract

The talk is a distinguished lecture jointly organized by the Hong Kong Institute for Advanced Study and the Department of Mechanical Engineering. The talk will present some of Professor Mitra group's fascinating research on encapsulation. They demonstrate the development of a robust liquid-liquid encapsulation framework where a thin layer of another shell-forming liquid stably wraps a liquid core analyte. Two approaches to achieve encapsulation are discussed - impact-driven and magnet-assisted. The underlying mechanism leading to encapsulation are explored in detail for both approaches. They show that successful encapsulation by either approach provides efficient protection to the core analyte even in aggressive surroundings. Multiple practical use cases are reported, including ultrafast encapsulation, shell-hardening, and subsequent extraction/handling of the wrapped cargo, the formation of encapsulated compound droplets with similar/dissimilar core compositions. Further, impact-driven encapsulation with a magnetoresponsive (ferrofluid) shell layer is also illustrated, which allows magnet-assisted efficient, non-contact manipulation of the encapsulated cargo, including translation, controlled coalescence, and the release of the inner core.

Biography

Professor Sushanta MITRA is a full Professor in the Department of Mechanical & Mechatronics Engineering and is cross-appointed as a Professor of Chemical Engineering, Electrical & Computer Engineering, Physics & Astronomy, and Chemistry at the University of Waterloo. He serves as the Executive Director of Canada's largest nanotechnology institute – the Waterloo Institute for Nanotechnology (WIN). Before joining Waterloo, he had several administrative roles in Canadian higher education, including Department Chair (Lassonde School of Engineering), Associate Vice-President Research (York University) and Assistant Vice-President Research (University of Alberta). He also served as the President of the Canadian Society for Mechanical Engineering. For his contributions to science and engineering, he has been elected a fellow of several professional organizations, including the Canadian Academy of Engineering, the Royal Society of Chemistry, the American Physical Society, the Electrochemical Society, the American Association for the Advancement of Science and a foreign fellow of both the Indian National Academy of Engineering and the National Academy of Sciences India. He has an entrepreneurial mind, being the Founder & CEO of a Canadian startup, Aquabits Inc. (on quantum computing) and a Dutch startup, SLE Enterprises B.V. (on ultra-fast encapsulation technology), supported by Waterloo.



Registration:

<https://go.cityu.hk/rg1eh6>

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