

## **Magic at Interfaces**

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The talk will present some of my group's fascinating interfacial science research, which enables new engineering processes. We have demonstrated that stable encapsulation of the core drop can be achieved using impact-driven interaction between the core drop and an interfacial shell layer. It can be further extended to create encapsulation of ferrofluids under magnetic actuation. Settling of such encapsulated drops in the presence of a surrounding viscous medium presents interesting wetting signatures not captured by traditional wetting theories. Using a cantilever-based technique, we further probed interfacial interactions such as adhesion forces between surfaces and drops. We provided a generic framework to characterize all types of surfaces (both hydrophilic and hydrophobic surfaces). We have developed a microscopy tool using dual-wavelength interference patterns to decipher the wetting signatures at the interfaces, both for rigid and soft solids. The talk will end with some interesting results related to the wetting of 2-D materials and how such knowledge can be utilized to create game-changing trapped ion systems.

**Speaker: Prof. Sushanta Mitra**

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**Biography**

**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 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 the University of Waterloo.