



MIE498H1: Research Thesis 2024-2025

Supervisor	Kevin Golovin
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Number of Positions	1
Open to	Undergraduate Mechanical Engineering Students
Term Offered	Winter 2025
Research Area	Materials – Thermofluids
Research Topic	Growth of attached lubricants to liquid glass
Project Description	

One way of forming highly liquid repellent coatings (so-called “omniphobic” materials) is by chemically bonding lubricant molecules to a surface. If the lubricant molecules are immiscible with the liquid you wish to repel, this strategy works well. A common example is the bonding of silicone oil to the surface of glass, which can be performed by heating the oil to around 100°C and leaving it for some time. The DREAM Lab has developed a method of depositing liquid glass onto surfaces, which is helpful as a primer layer when applying other coatings to the surface. For example, depositing an omniphobic coating directly on the surface of plastics or metals is difficult, but depositing onto the liquid glass layer works well. The purpose of this project is to understand if the above-mentioned silicone oil method of making an omniphobic surface works equally well on our liquid glass as compared to regular glass. We wish to understand if the omniphobic properties are maintained, or even improved, when using our liquid glass primer.

Additional Information

The student working on this project will learn how to deposit the liquid glass and characterize its roughness, thickness, and chemical reactivity. They will then learn the "silicone oil" method of forming omniphobic layers. They will then compare the omniphobic properties of the layers, deposited either on glass or the liquid glass.

Application Instructions

Please send your CV and unofficial transcript to kevin.golovin@utoronto.ca