

Title: **Functional Coatings for Ice Shedding Applications**

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Abstract:

Despite the countless advancements in repellent coatings, ice accretion remains a significant challenge for which we have limited defenses. Accumulations of ice on modern infrastructures often have severe or even catastrophic consequences, and yet current methods to combat this are typically quite inefficient, expensive, time-consuming and/or not environmentally friendly. As such, there is significant interest in developing functional coatings that can passively prevent ice from accumulating on surfaces. While slippery liquid infused porous surfaces and oil-swollen elastomer gels (organogels) have shown some success in this field, they are both limited by lubricant loss and poor durability. In this seminar, I will present two different coating designs to combat these issues. The first consists of a thermo-responsive organogel which can minimize lubricant losses by allowing it to be excreted on the surface only at temperature below 0 °C when icing may occur, while safely storing it inside the matrix at temperatures above 0 °C when icing is unlikely to occur. This allowed for long-lasting ice shedding properties such that ice could be easily removed up to 50 times on a single sample. The second coating consists of a bilayer coating that can decouple the mechanical properties from the ice shedding properties. In this case, a highly crosslinked epoxy matrix provides the mechanical durability, while a silicone oil swollen layer of liquid-like poly(dimethylsiloxane) chains at the surface provides excellent and long-lasting ice shedding properties. This offers a great improvement over other types of ice shedding coatings in which the ice shedding ability is tied to the softness of the material and therefore lacks durability.