

Polyurethane Coatings with a Crosslinking Density Gradient for Ice Shedding Applications

The buildup of ice and snow on critical infrastructure like utility equipment and airplanes threatens public safety and economic productivity. While ice can be actively removed from a surface through mechanical, thermal, or chemical means, these methods increase the operational complexity of the system and usually require a considerable input of energy, resources, and time. As such, there is considerable scientific and industrial interest in developing passive methods that reduce or prevent ice buildup without need for human intervention.

Ice-shedding coatings are a type of passive de-icing materials that use liquid lubricants and/or low shear moduli materials to obtain low ice adhesion strengths. While these coatings have been shown to be highly effective at shedding adhered ice, they are typically soft and susceptible to mechanical damage. I have developed a polyurethane-based coating system with a crosslinking density gradient that can easily shed adhered ice and possesses good mechanical properties. In this seminar, the design methodology, synthesis, and ice-shedding performance of these coatings will be discussed.