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Effect of surface morphology on anti-icing DUCK-GYU LEE, THANH-BINH NGUYEN, WAN-DOO KIM, HYUNEUI LIM, Korea Institute of Machinery & Materials — A water drop on a sub-cooled surface undergoes solidification, and it is well known that the anti-icing effects such as delayed freezing time and low adhesion force are determined by surface morphology. To quantitatively understand the effect of surface morphology on anti-icing behavior, we first theoretically predict the freezing time of a water drop on a sub-cooled micro patterned substrate and show that the time delay is in good agreement with experimental results. Then we develop a simple theory for the work of adhesion upon consideration the substrate geometrical condition in order to prevent it from being broken due to the adhesion. Finally, we provide the morphological conditions for the pattern under which the freezing time delay is maximized and the work of adhesion is minimized.

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