

Applying Surface Engineering to Thermal Fluid Research and Applications

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Abstract - Energy transport between fluids and solid walls takes place at the fluid-solid interface, and the solid surface plays an important role in affecting thermal fluidic behaviors and the energy transport. The surface effects become even more significant when multi-phase fluids are in contact with the surface, and in this case roughness and wettability are the major surface properties. There has been much research interest in applying modified surfaces in thermal fluid research and applications, and surface modification can be achieved by applying micro- and nano-scale surface textures and changing the surface chemistry. It is important to understand how the modified surfaces affect thermal-fluidic performance. In this talk, focus will be put on the surface effects related to droplet impact dynamics, droplet freezing, and transient boiling involved in a droplet train quenching high temperature substrates. Additionally, the surface effects on the bubble dynamics and heat transfer in pool boiling will also be discussed.