

Manipulation of Phase Change Phenomena with Mixed Wettability and External Fields

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Extended Abstract

Boiling, droplet condensation, and freezing are major phase change phenomena which can be controlled with the use of mixed wettability surfaces and external fields. One of the most promising approaches to introduce mixed wettability is the preparation and use of biphilic surfaces (hydrophobic-hydrophilic, superhydrophobic-hydrophobic etc.). On biphilic surfaces, pool boiling, flow boiling, dropwise condensation and freezing could be manipulated to have the best performance and energy efficiency in thermal management and energy systems. In addition, external fields such as external magnetic field can also serve for affecting phase change phenomena on such functional surfaces and can further contribute to the performance enhancement and energy efficiency. In this talk, research efforts and outputs as well as recent developments and future research directions in these fields will be presented and discussed.