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Suppression of Coalescence-Induced Droplet-Jumping on Superhydrophobic Surfaces by Microstructures YOTA MAEDA, Kyushu University, PENG ZHANG, FENGYONG LV, Shanghai Jiao Tong, ALEXANDROS ASKOUNIS, BIAO SHENG, YASUYUKI TAKATA, DANIEL OREJON, I2CNER, Kyushu University — Superhydrophobic surfaces are receiving increasing attention due to their enhanced condensation performance, which is owed to the ability to shed-off the condensate either by gravity or by coalescence-induced droplet-jumping. In this work we study the effect of microstructures on coalescence-induced droplet-jumping phenomenon. The frequency of the droplet-jumping events is found to decrease when increasing the density and the size of the microstructures. In addition, important differences in the droplet size distribution and in the number of coalescing droplets involved in the jumping events are reported. In the presence of microstructures, bigger and greater number of droplets are required to coalesce for the jump to ensue. Furthermore, we report the suppression of the droplet-jumping performance of droplets in size similar to that of the microstructures. We propose that microstructures introduce a droplet an angular deviation from the main surface normal so, upon coalescence, droplets sitting on the side of the microstructures will not fully contribute to the jump in the out-of-plane direction. As consequence the heat transfer performance due to small jumping droplets is reduced in the presence of microstructures. The authors acknowledge the support of WPI-I2CNER and KAKENHI JSPS.

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