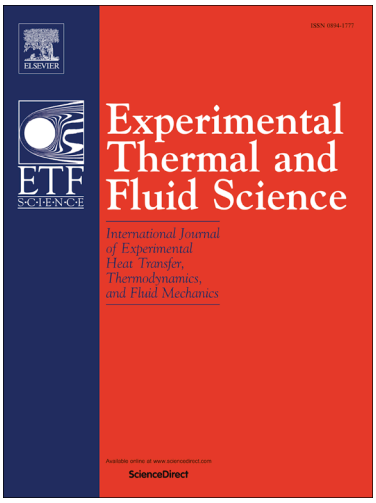

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Experimental study of pool boiling heat transfer on novel bistructured surfaces based on micro-pin-finned structure

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Highlights

• Novel bistructured surfaces based on micro-pin-finned structure is designed and adopted into pool boiling experiment.
• Novel bistructured surfaces can enhance the Q_{CHF} by 120% and reduce the wall temperature by 10K compared to smooth surface.
• High speed camera with microscope is applied to capture the micronization boiling phenomenon.
• Featured boiling phenomenon is observed that bubbles form in the micro-pin-finned area then slip to the smooth channel which causes strong thermocapillary flow and mass transfer.
• Traditional dynamic model of bubble departure is improved to suit for the novel surfaces.

Abstract

The pool boiling heat transfer performance of bistructured surface based on micro-pin-finned surface structure was experimentally investigated in this study. A high speed camera with microscope was applied to capture the micronization boiling phenomenon and study the mechanism of bistructured surfaces. The micro-pin-finned area which provides nucleation sites and the smooth area are fractally distributed on the heating surface by micromaching (dry etching) method. The P-doped silicon chips with 6 different surface types -- smooth chip, PF30-60 (micro-pin-fins with 30μm fin

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