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Heat Transfer Engineering
2019

## Measurement of a Heated Surface Temperature Using a High-Speed Infrared Camera During Critical Heat Flux Enhancement by a Honeycomb Porous Plate in a Saturated Pool Boiling of a Nanofluid

( Article in press ? )

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### Abstract

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This article presents an experimental study to investigate the critical heat flux (CHF) enhancement mechanism using honeycomb porous plate (HPP). The CHF enhanced significantly with combination of the HPP and nanofluid, up to 3.2 MW/m$^2$ at maximum compared to a plain surface, 1.0 MW/m$^2$. The mechanism by which the CHF is improved in this system was elucidated by measuring the temperature of the heated surface using an indium tin oxide (ITO) heater and a high-speed infrared camera. The pool boiling experiment of water and nanofluid is performed under saturated temperature and atmospheric pressure conditions. The CHF values obtained using ITO heater is in good agreement with a conventional CHF pool boiling experiment with HPP attachment. High-speed infrared camera is analyzed to understand the behavior of local temperature at various locations over time. It is observed at the burnout condition, the highest average temperature is occurred at the intersection of HPP wall. Moreover, the reversible dry spots were initiated in the cell part of the HPP, and small dry spots coalesced into a growth of large irreversible dryout that leads to burnout. Further CHF enhancement could be realized if the initiation of the dryout region could be suppressed. © 2019, © 2019 Taylor & Francis Group, LLC.

### SciVal Topic Prominence

Topic: Boiling liquids | Heat flux | Nucleation sites

Prominence percentile: 99.030

### Indexed keywords

Engineering controlled terms: Atmospheric pressure | Atmospheric temperature | Honeycomb structures | Indium compounds | Infrared devices | Nanofluidics | Porous plates | Temperature indicating cameras | Tin oxides

Engineering uncontrolled terms: CHF enhancement | Critical heat flux(CHF) | Enhancement mechanism | Indium tin oxide | Infra-red cameras | Local temperature | Saturated pool boiling | Saturated temperatures

Engineering main heading: Heat flux