Background & Objective

- Modulated porous surface features are experimentally shown to enhance the pool-boiling critical heat flux nearly three times over that of a plain surface, and to reduce the surface superheat in the meantime.

- Mass production of such surfaces, however, is a challenge when robustness, cost-effectiveness and high productivity requirements are considered.

- Thus, the aim of this study is to develop a novel manufacturing process that will result in modulated porous surfaces with micro-scale features (<10 particle diameters) on a solid thin sheet substrate (200-500 µm) in an efficient and cost-effective way.

Accomplishments

- Modulated porous surface features are experimentally shown to enhance the pool-boiling critical heat flux nearly three times over that of a plain surface, and to reduce the surface superheat in the meantime.

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State-of-the-Art

[Davies, Liu, Banhart, Webb and Kunugi]

- Proposed fabrication method: **hot compaction**

Heat transfer potential of various surface modifications

- [Liter & Kaviani, 2001]

Temperature-Dependent Modulated Porous-Layer Coatings

Fabrication of metallic porous structure

- Metal vapour
- Liquid Metal
- Metallic powder
- Metal ions

- Vapour deposition
- Direct foaming with gas
- Direct foaming with blowing agent
- Eutectic solidification
- Casting
- Spray forming

- Sintering
- Hot pressing
- Powder slurry foaming
- Pressing around filters
- Etching

Future Work

- Conduct hot compaction experiment
- Improve the current hot compaction numerical model