MANUFACTURING OF POROUS SURFACES WITH MICRO-SCALE FEATURES FOR ADVANCED HEAT TRANSFER

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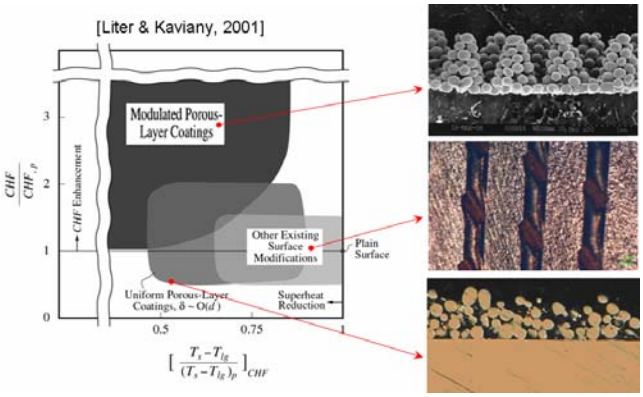
Background & Objective

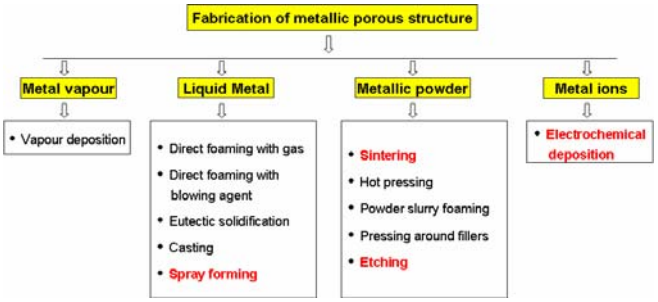
- Modulated porous surface features are experimentally shown to enhance the pool-boiling critical heat flux nearly three times over that of a plain surface, and to reduce the surface superheat in the meantime.
- Mass production of such surfaces, however, is a challenge when robustness, cost-effectiveness 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.



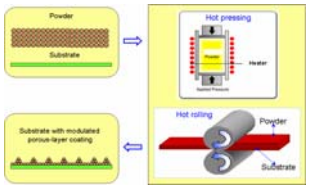
Heat transfer potential of various surface modifications

State-of-the-Art

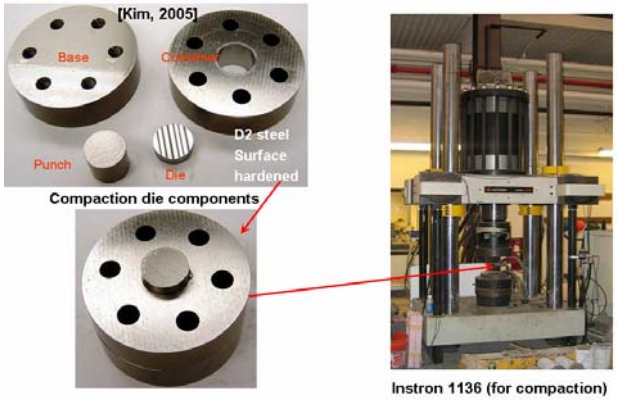
[Davies, Liu, Banhart, Webb and Kunugi]



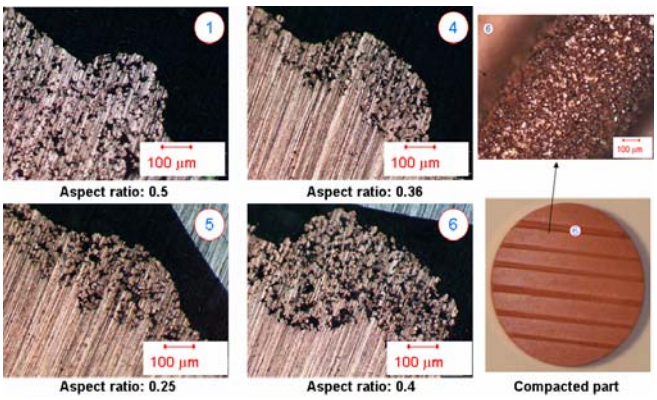
- Proposed fabrication method: ***hot compaction***



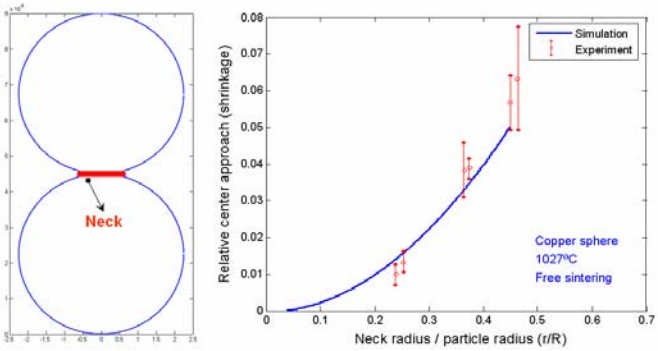
Accomplishments



Experimental setup for cold compaction



Successfully formed micro-features



Validation of our numerical model for hot compaction

Future Work

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

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