

Through its innovative open-cell metal foams, Metafoam<sup>®</sup> Technologies is revolutionizing pool boiling technologies by significantly increasing performance of boiling surfaces. As such, Metafoam is facilitating the introduction of new generations of thermosyphons, vapor chambers, jet impingement & spray cooling solutions, and other pool boiling products.

### ■ Metal Foam Boiling Plates

In order to manage increasing heat fluxes, thermal engineers are considering aggressive two-phase liquid cooling solutions. Typically, the main performance objective for pool boiling is to reach a high critical heat flux (CHF) while maintaining a low surface superheat (SSH). CHF is the maximum heat flux that can be handled by a boiling surface before performance drops (dryout). SSH is the difference between surface temperature of the boiling apparatus and fluid saturation temperature. By optimizing both parameters with its innovative material, Metafoam can thus offer a greatly enhanced solution.



- Because of metal foam unique microstructure which yields high capillary force, the coolant is quickly pumped toward the heat source for quick and efficient evaporation.
- Modulated design of metal foam coating allows a good separation of vapor and coolant flow which enhances boiling efficiency.
- New patent pending processes to bond metal foams to plates reduce the thermal resistance of the interface.
- Passive pool boiling solutions reduce the costs related to forced convection liquid cooling since it does not require any pump and it is quicker to fill during manufacturing.

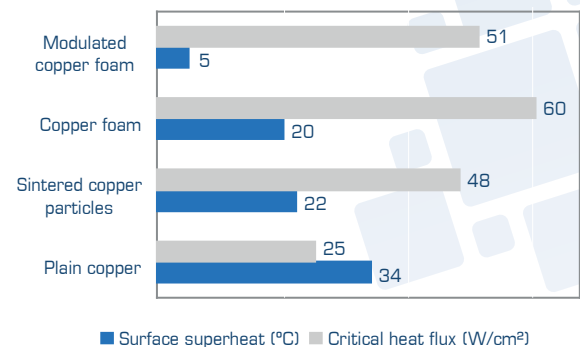
### ■ High Performance Boiling Plates

Preliminary tests conducted at The University of Michigan by Professor Massoud Kaviany, an heat transfer expert, on copper foam coated copper plates have shown superior results. The tests used n-Pentane as the fluid at a pressure of 1 atm.

Metafoam's initial boiling plate prototypes reached a CHF of up to 64.2 W/cm<sup>2</sup>. Such a CHF is respectively 2.6 and 1.4 times higher than plain surface and pressed copper particles. SSH of 5°C was reached for a CHF of 51 W/cm<sup>2</sup>, that is 5 to 7 times better than competing solutions.

According to Professor Kaviany, these results are highly promising considering that minor improvements may lead to significantly higher CHF.

Surface superheat and critical heat flux of metal foam compared to plain surface & pressed particles



### ■ Business Partners Sought

Metafoam's vision is to become the world's leading open-cell metal foam manufacturer for value added and mass market applications. In that regard, Metafoam is looking to enter into partnerships with leading thermal management solution providers to co-develop high performance solutions and/or directly integrate its materials into existing products.

Metal foams can also be used in high performance cold plates, heat pipes or heat exchangers. Various base material (Cu, Ni, Fe, steel and Cu-Ag...) can be used and the properties (porosity, pores size, density, ...) of the foam can be adapted to meet specific needs.

Please contact our team to learn more about these exciting possibilities...

**Karine Vézina**  
Marketing Director

☎ 450.444.5678 ext. 226  
✉ 450.444.5650  
@ karine.vezina@metafoam.com

4155, Matte Blvd, Suite 4167  
Brossard (Quebec)  
Canada J4Y 3C2

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