Precision Engineering Group

Thermal Performance of a Vapor Chamber Heat Pipe with Diamond-Copper Composition Wick Structures

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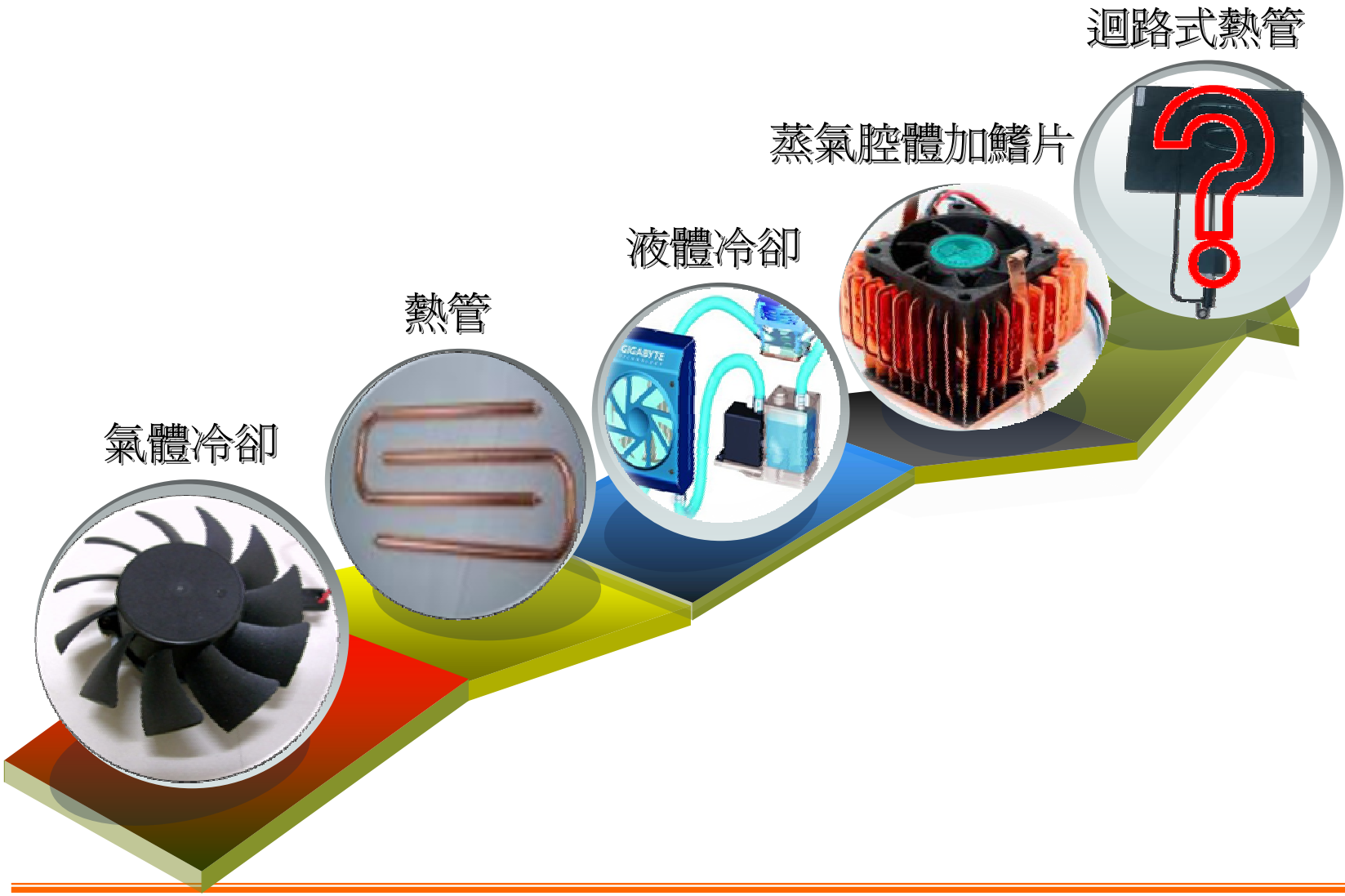
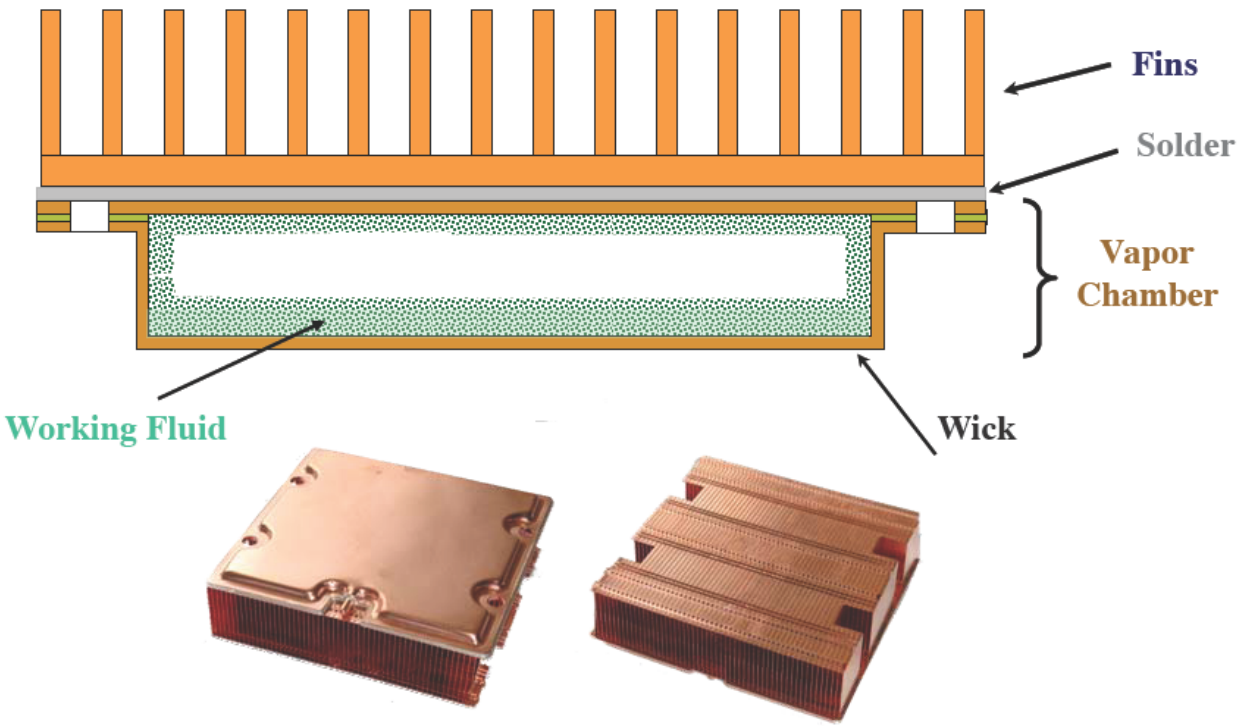
散熱器發展歷史

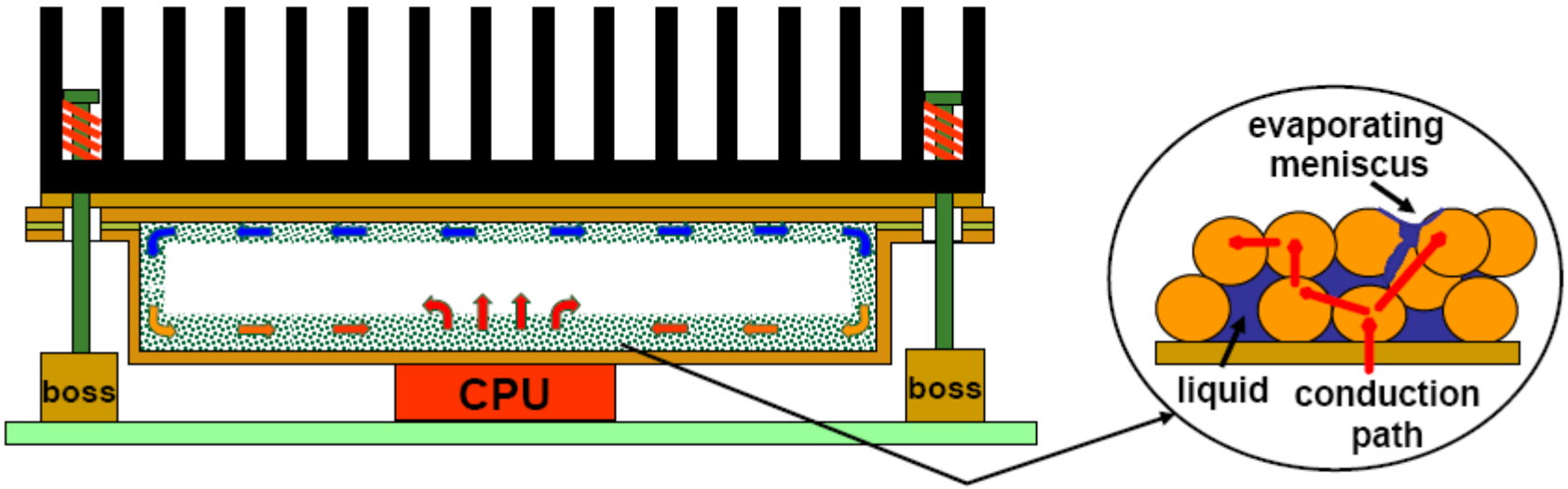


Vapor Chamber

- Vapor Chamber（稱平板式熱管或蒸氣腔體）
- 有無噪音、無電力需求、成本低廉之特性
- 具有優異的傳熱能力

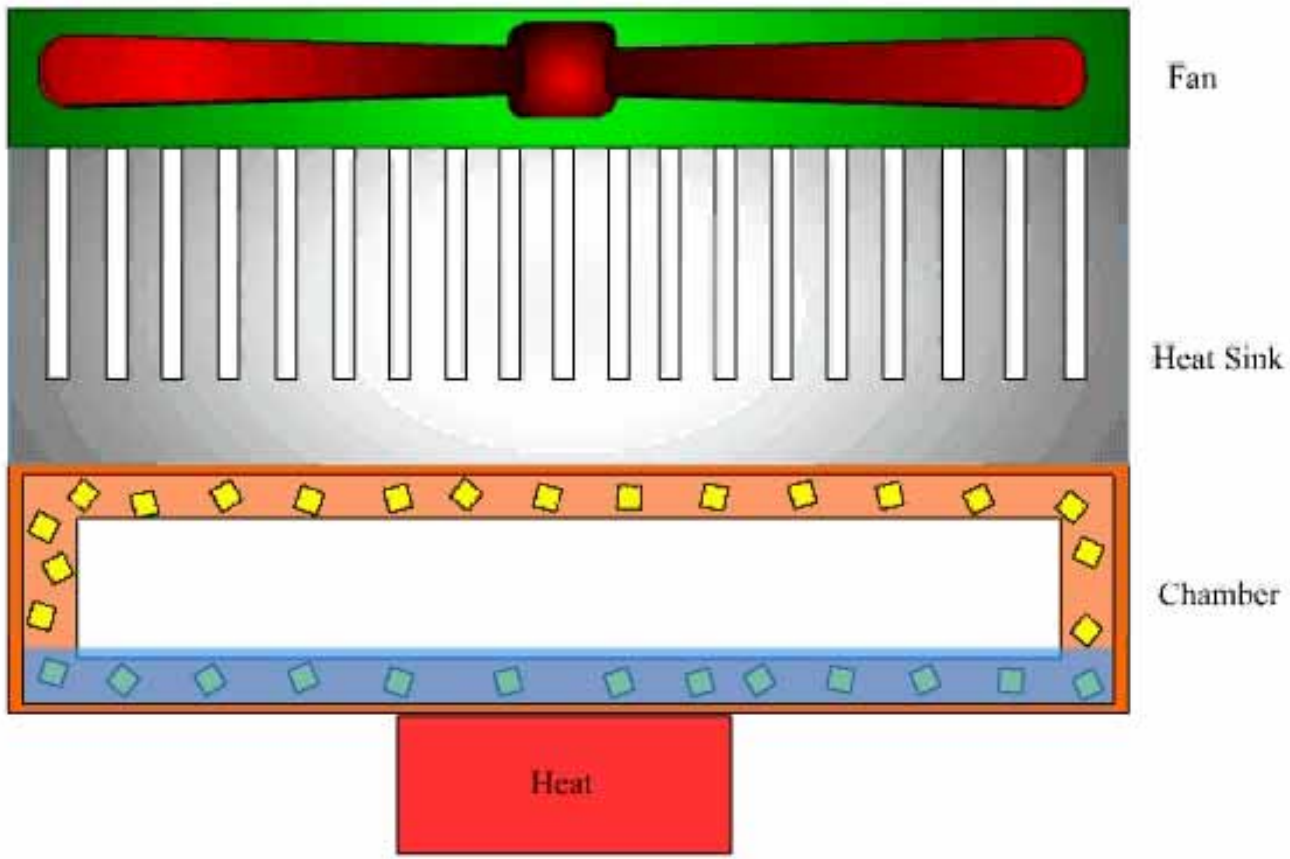


Operation Principle

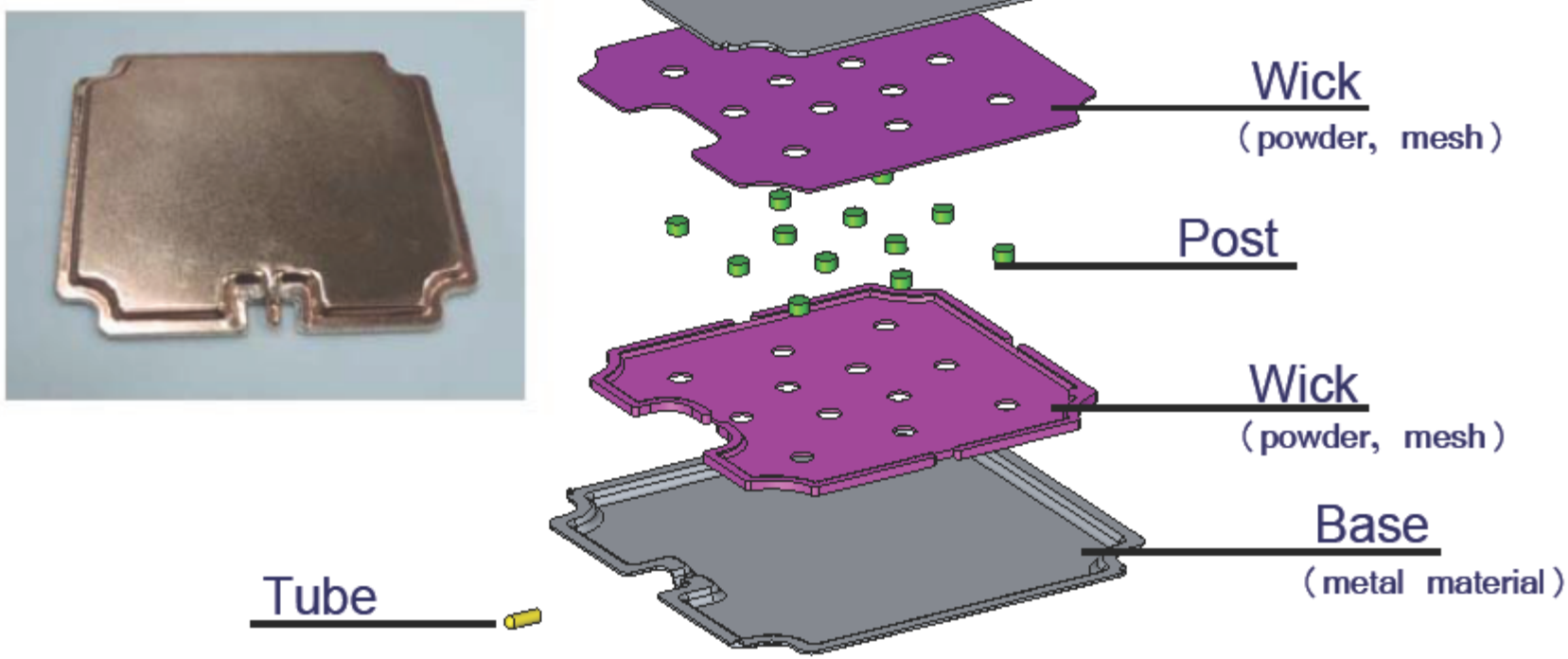


- Water boils at heat input area (e.g. CPU), absorbing heat energy. Boiling temp is < 100℃ due to vacuum inside chamber.
- Vapor travels, at the speed of sound, throughout the chamber.
- Vapor condenses on the cold surface (fin side), transferring heat.
- Water returns by capillary action through the wick to the heat input area.

蒸氣腔體散熱模組



Assembly of Vapor Chamber



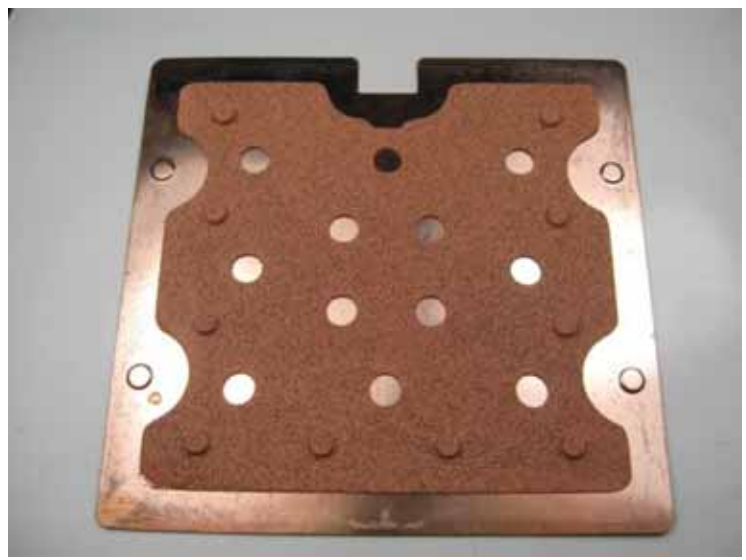
材料之熱傳導係數

Materials	Thermal Conductivity (W/mK)
Diamond	1000-2400
Silver	429
Copper	380
Gold	318
Aluminum	237
Vapor Chamber	?

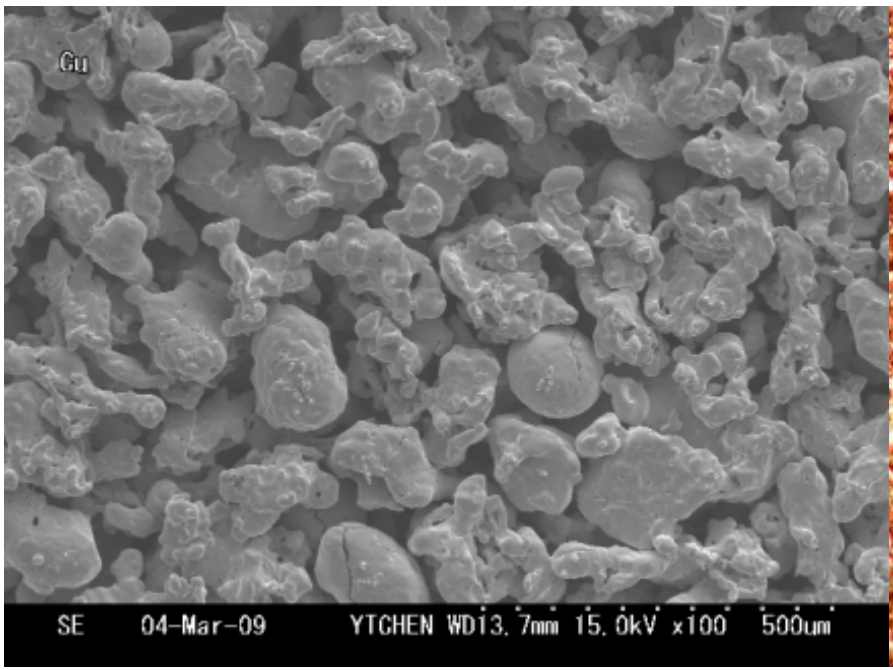
資料來源：http://www.answers.com/topic/thermal-conductivity

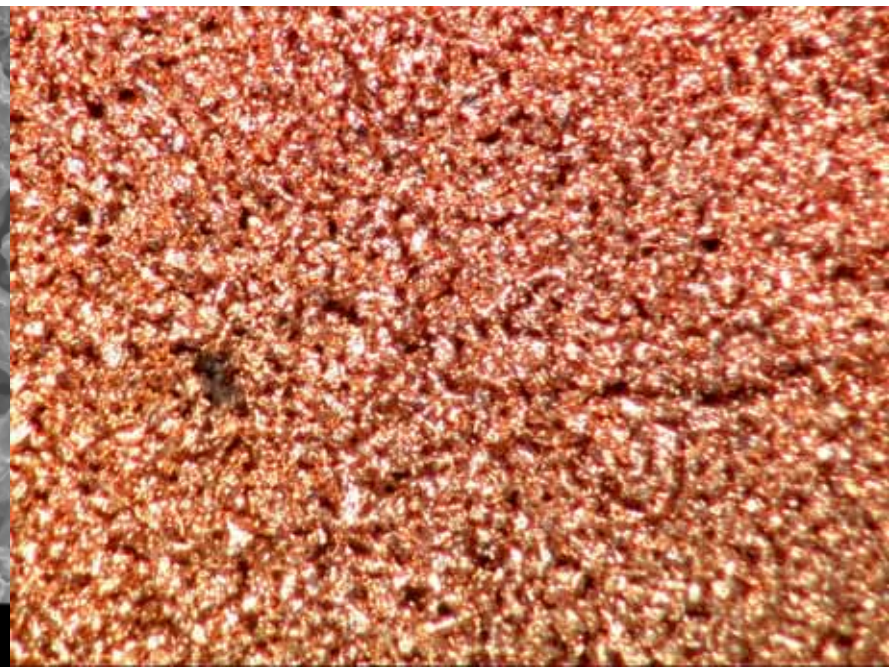
Dia-Vapor Chamber

利用鑽石散熱佳、導熱快、熱傳係數高之特性，將Vapor Chamber中的銅粉毛細結構以鑽石複合材料取代。比較鑽石之不同形狀、不同粒度與混合比例燒結，作為Vapor Chamber內毛細微結構，找出散熱效益最佳之比例組合。

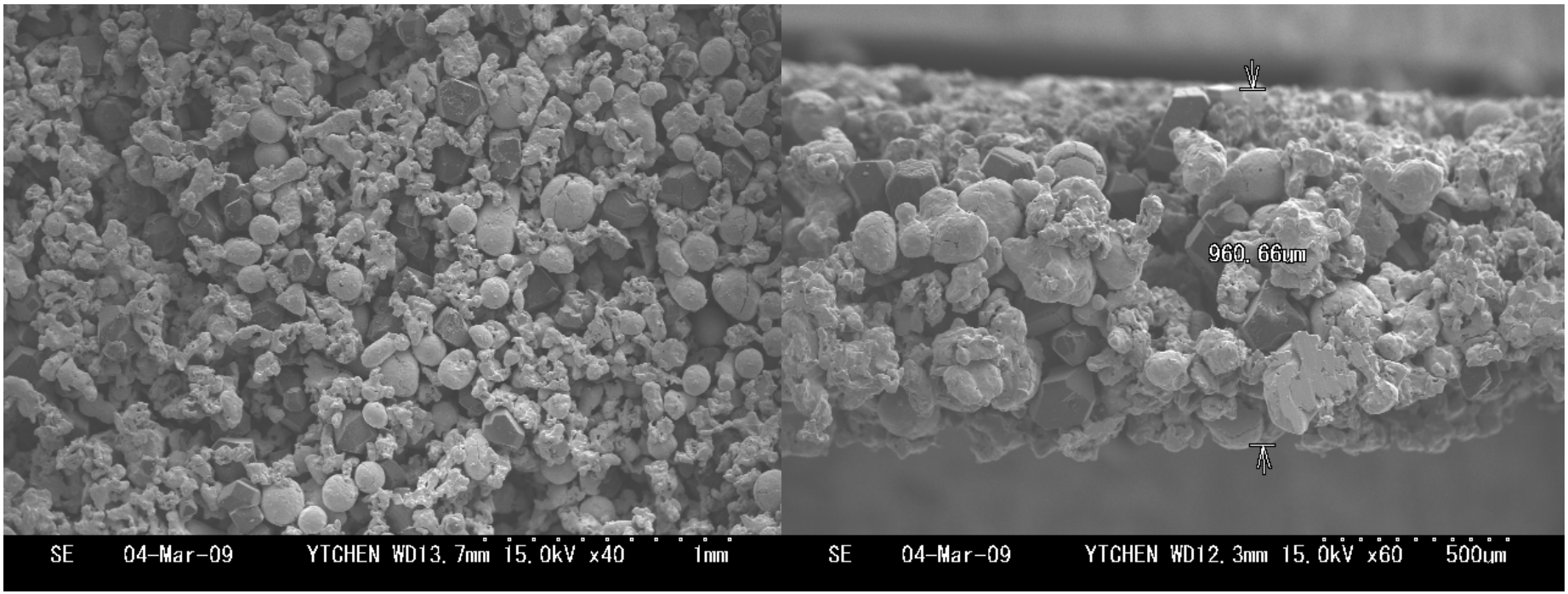


Wick(純銅)

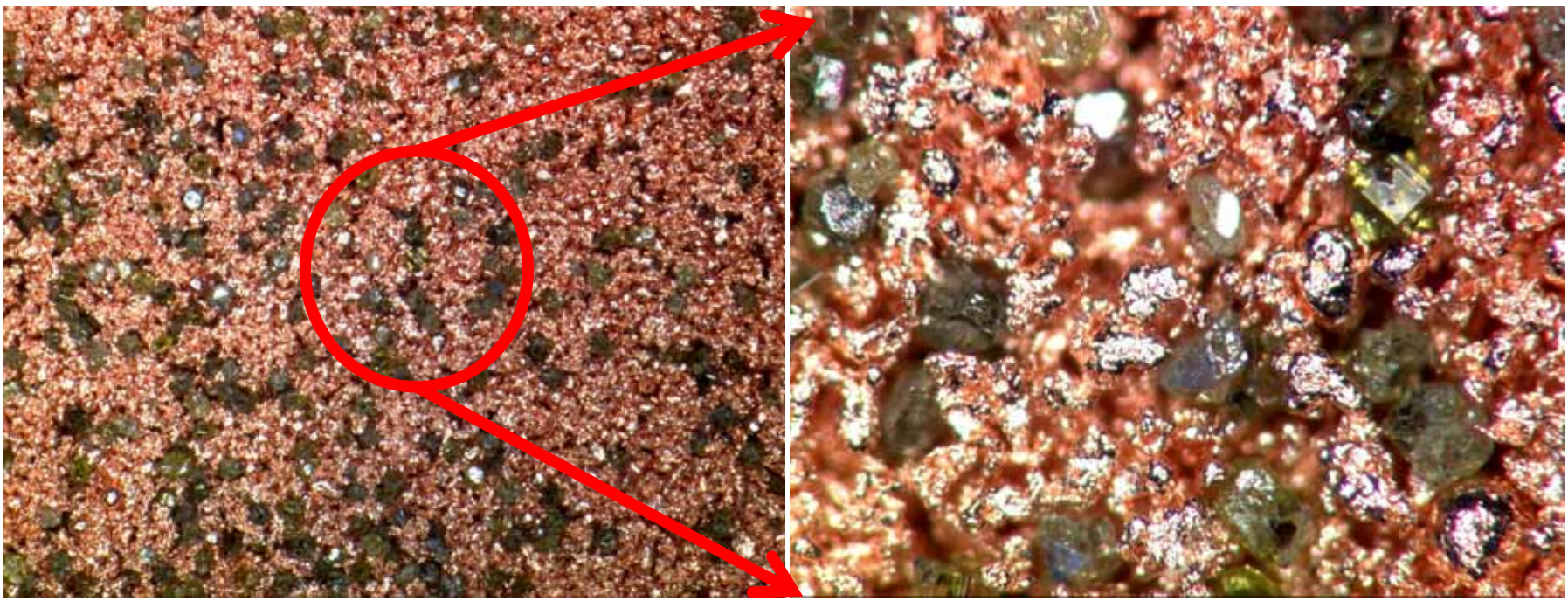




Wick (Diamond：Cu＝1：3)

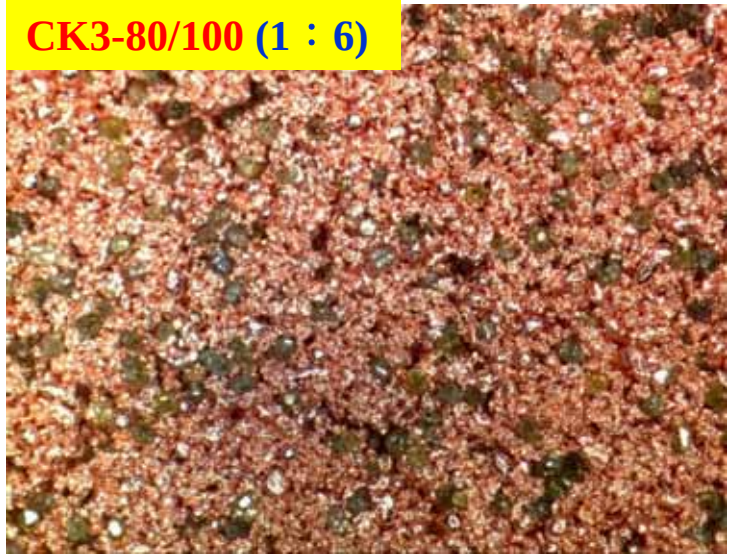


Wick(Diamond：Cu ＝1：6)

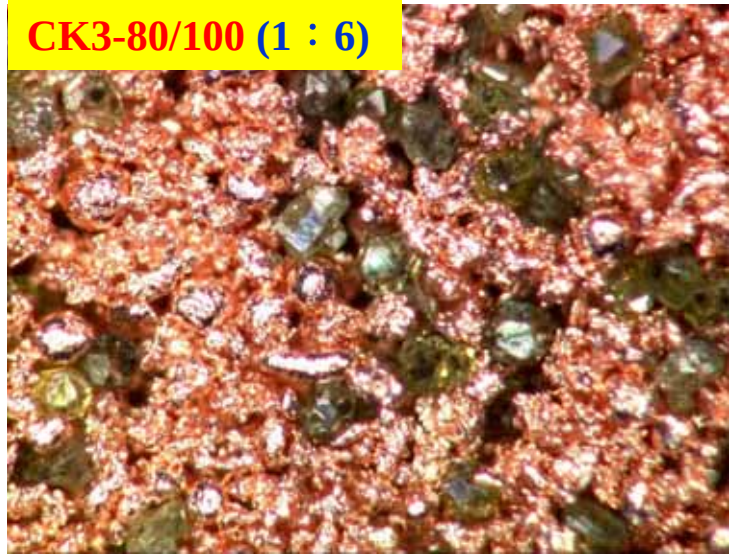


不同鑽石粒度/形貌之表面結構

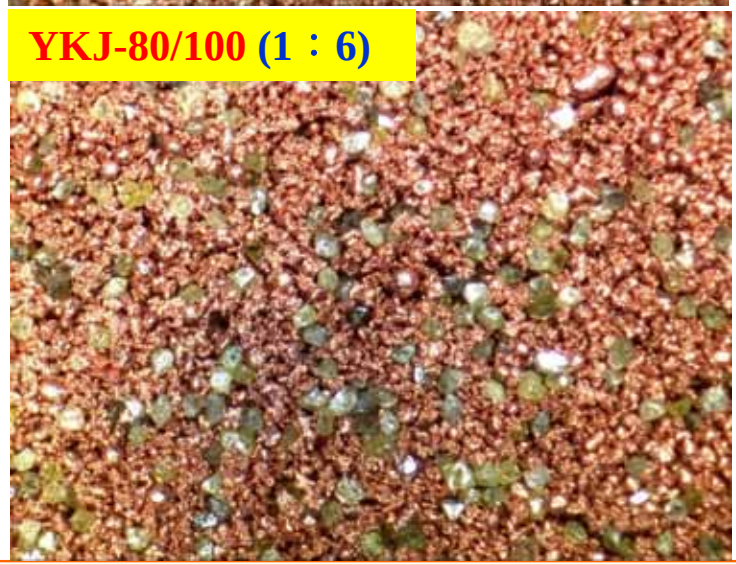
CK3-80/100 (1：6)



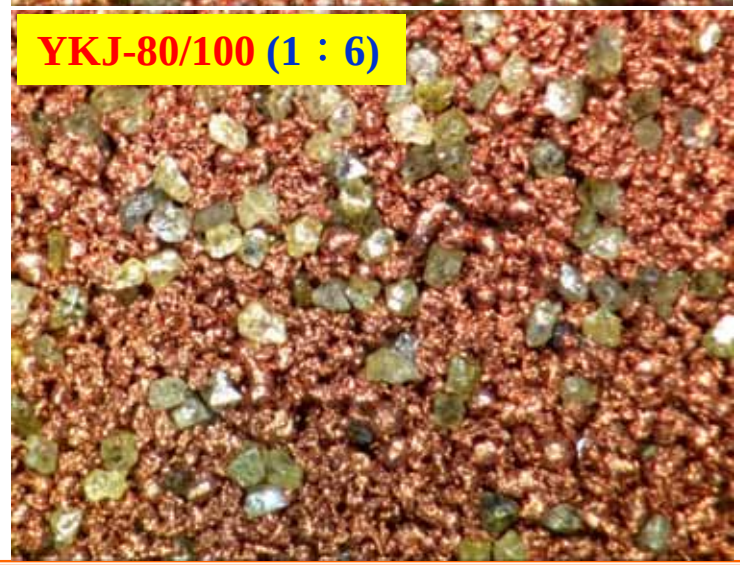
CK3-80/100 (1：6)



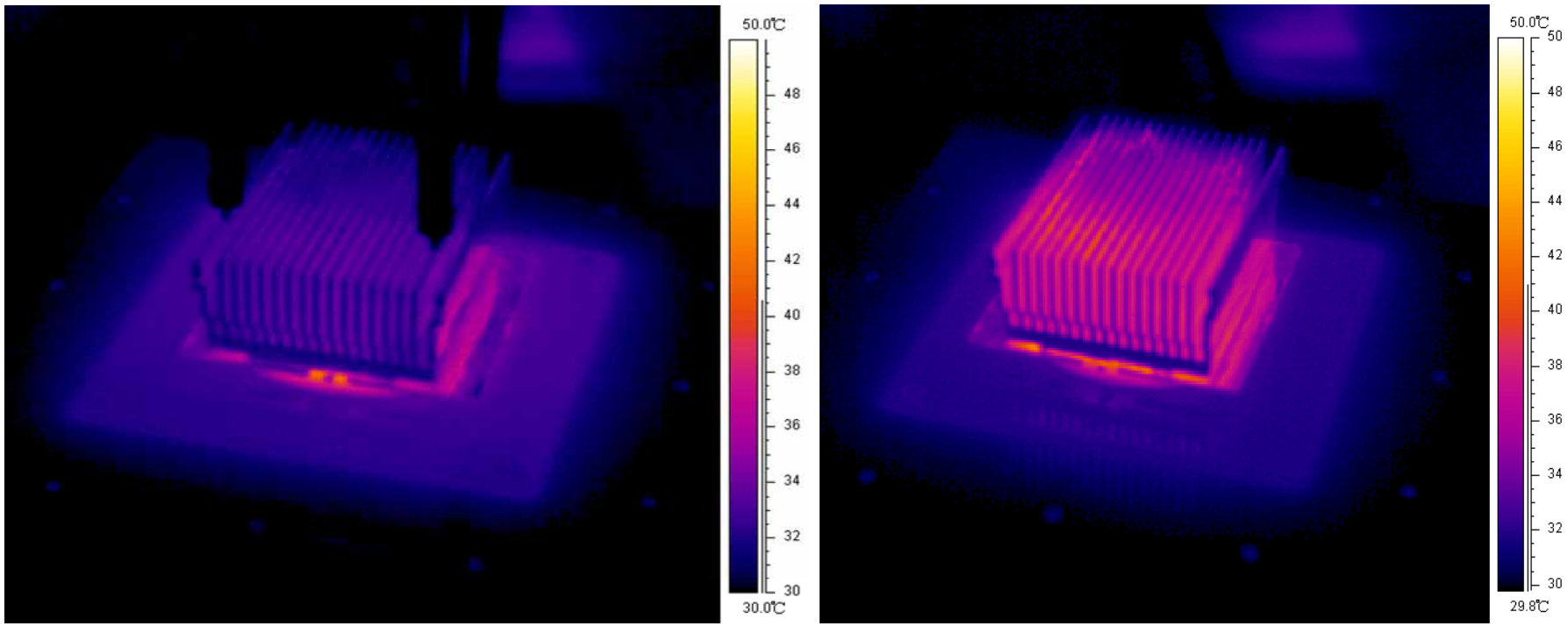
YKJ-80/100 (1：6)



YKJ-80/100 (1：6)

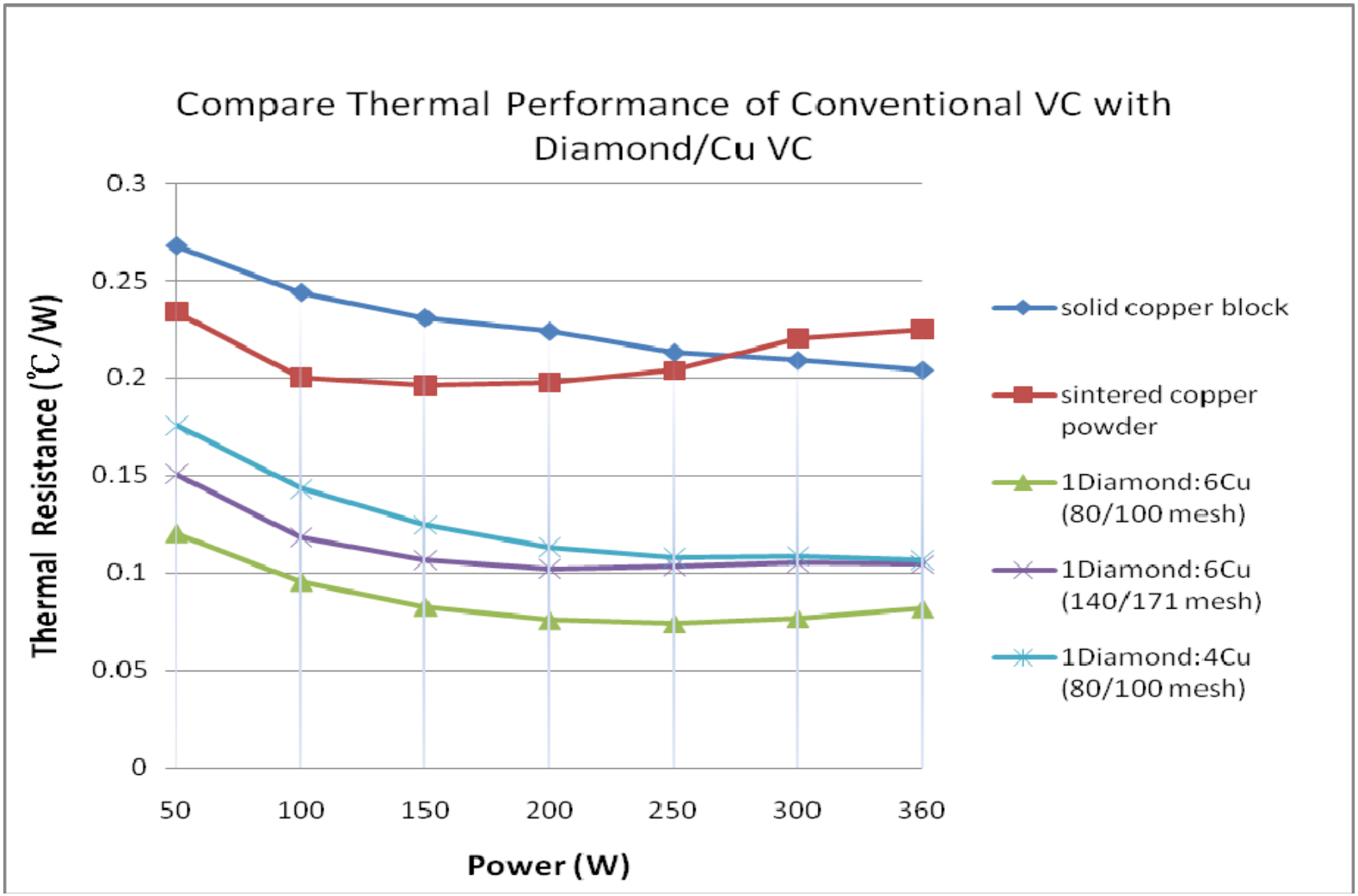


Vapor Chamber Superior heat spreading



紅外線溫度顯像圖

Thermal Resistance Performance Test



Thanks