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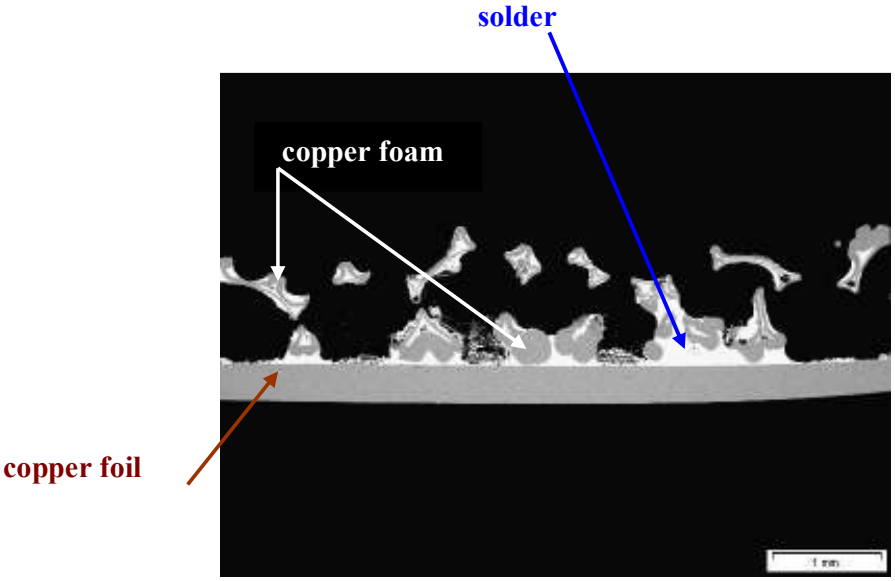


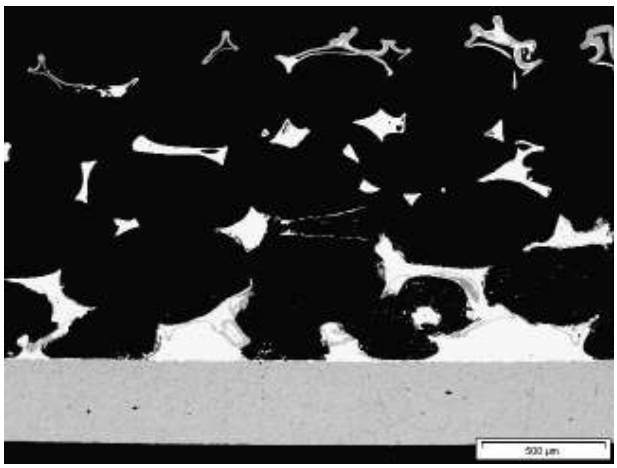
45 ppi / 1500 g Cu/m² foam soldered to a 350µm copper foil

Solderability of a COPPER FOAM

In regard the use of copper foam in various applications, including heat exchange, its solderability has been demonstrated while combining a copper foam strip with a copper foil.

-Soldering as described below allows for a strong and durable bonding of foam to foil.

-The open foam structure is preserved, and the solder alloy filling of the copper struts enhances both thermal conduction and mechanical stability of the composite structure.



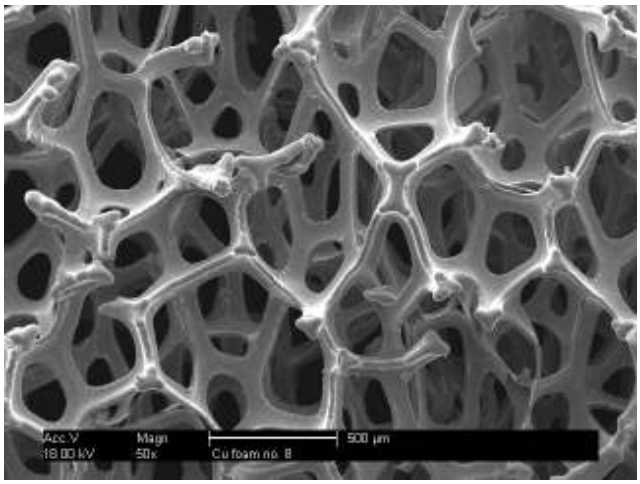
90 ppi / 350 gCu/m² foam soldered to a 350µm copper foil

Detail illustrating partial filling of the copper struts by the solder alloy

Materials involved:
-copper foam (EFOAM): 45ppi and 90ppi / 350-1500 gCu/m²
-copper foil (CIRCUIT FOIL): 350µm electrodeposited pure copper foil
-solder: a commercial solder paste, including flux, for application with a brush

Soldering procedure:
-Before the copper foam is to be put in contact with the foil, **the foam must be calendared** (or compressed under static load): the reduction in thickness shall be approximately 25%. **Calendaring insures that a maximum fraction of copper struts shall terminate exactly in the plane defined by the foil's contacting surface.**
-Before assembly of the foam/foil sandwich, the copper foil is evenly coated on one side with a thin solder paste film. The *'as supplied'* copper foam does not require a pretreatment.
-Soldering was performed in air, notably in an oven or simply on a hot plate. The peak temperature and hold time (typically 270°C for 45 seconds) were adapted to the specific solder paste used. Brazing under similar conditions can be envisaged.

Results:
- Due to the homogeneity and high strength of the bonding, **flexibility of the composite structure is preserved**.
-The outstanding surface purity of the materials involved (notably EFOAM's inherently low residual carbon content) allows for a very high wettability by the liquid solder: therefore, accumulation of free solder is minimized, **the open foam structure is maintained**, but the hollow copper struts are filled with the solder alloy.
-The filling of the (originally hollow) copper struts **enhances both heat conduction and mechanical stability of the foam**.



Copper foam *'as supplied'*

The objective of this report is to suggest, in general terms, a way by which soldering or brazing can be used advantageously for joining (copper) foam and (copper) foil, notably in regard to making elements that facilitate heat exchange. For optimum results, we recommend using selected soldering/brazing materials and procedures supplied in regard to a specific application.