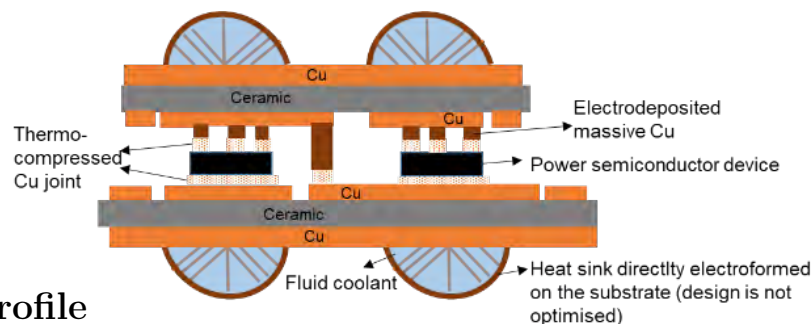

Materials Science - Thesis Proposal

Synthesis and thermocompression of nanoporous Cu films for aircraft electronic module efficiency

Context and objectives of the thesis work

The present PhD work is part of the ANR Copperpack project led by [SAFRAN](#) and involving different academic partners ([SIMaP](#), [UTINAM](#) and [G2ELAB](#)). In the current context of mass and volume reduction for energy savings, new high performance double sided cooled power electronic modules have to be designed and evaluated, especially with the development of the More Electric Aircraft. The Copperpack project aims at developing such new modules using copper as a heat sink and bonding material.

Among the different scientific and technical aspects of this ambitious project, the SIMaP laboratory will be in charge of the study of (i) the processing of the nanoporous Cu free standing films as well as (ii) their thermocompression ability for their future integration inside the power module (see Figure). The PhD student will study the processing of such film using melt spinning and dealloying procedures with the main objectives of understanding and therefore controlling their thickness and porosity architecture (size and distribution). Concerning thermoforming, the PhD student will study, *in situ*, the thickness variation of the film as a function of the heating profile and the applied pressure, both in air and under neutral atmosphere to study the impact of copper oxidation. The analysis will be completed by microstructural observation and compared with constitutive models for the deformation of porous metallic materials.



Applicant's profile

The candidate must possess a scientific background in the domain of materials science. Interests and skills for experimental work (processing, mechanical and microstructural characterization) is mandatory. In addition, the important collaborating work with various scientific (academic and industrial) partners requires good organizational, team-work and communication abilities from the candidate.

- **Location** : SIMaP laboratory, [GPM2](#) group.
- **Duration** : 36 months.
- **Salary** : Public thesis scholarship (about 2100 € gross monthly).
- **Contacts** : Jean-Michel Missiaen - jean-michel.missiaen@phelma.grenoble-inp.fr.