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Application for beam time at ESRF – Experimental Method

This document should consist of a maximum of two A4 pages with a minimal font size of 12 pt.

Aims of the experiment and scientific background

This project is concerned with management of heat and mass transfer in functional units of a fuel cell system (reformer, fuel purifier, heat exchanger...). Use of open-celled, high-porosity materials optimized for each of these functions will allow compact multifunctional and integrated systems to be created. Scientific key points are:

- development of tools for morphological characterization of these materials
- development of experimental set-up & models for characterizing thermo-physical & chemical properties
- understanding of heat and mass transfer phenomena in these materials
- impact of solid matrix structure (topology) on these phenomena

We will design specific foam textures adapted to each function (heat transfer, mixing, catalysis...) for integration into a fuel-cell system; a prototype will be built and performance of the constitutive units (reformer, boiler, heat recovery unit) will be evaluated and compared with standard commercial ones.

Experimental method

Obtain high resolution 3D images tomography.

Results expected

Characterization of 3D geometry from High resolution tomography to understand and predict heat and mass transfers propertys of metallic foams.

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