Introduction: Cellular materials are challenging class of materials, able to offer almost unique combination in terms of morphology and material performances. In this work a Cu based foam (see Figure 1) was used as active element in a heat exchanger.

Definition of the model: for the modeling of the heat exchanger (see Figure 2), different zones were considered:
- moist air at high temperature, as input;
- porous medium;
- air at lower temperature, as output;
- external tube in brass.

The following physics were considered:
- heat transfer in solids/fluid;
- free and porous media flow;
- transport of diluted species.

Results: the foam performances has been evaluated in terms of:
- fluid velocity;
- fluid pressure;
- solid and fluid temperatures;
- water concentration in the moist air.

The fluid velocity is decreased from 0.5 m/s to 0.25 m/s during its passage through the foam.

Conclusions: The fluid-dynamic field is strongly modified when the fluid passes through the foam. In fact, more than 60% of the fluid temperature is decreased across the foam. This confirms how the heat transfer is favorable in the porous medium.

References: