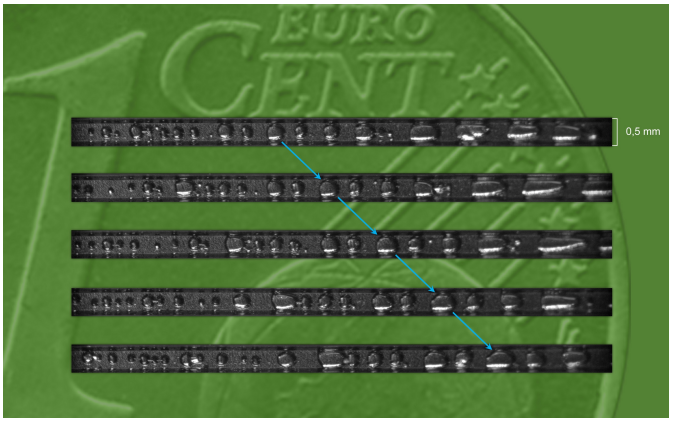
Granted PhD at Laboratoire de Écoulements Géophysiques et Industriels (LEGI), Université Grenoble Alpes – CNRS – GINP, France.

## Two phases flows regimes of $CO_2$ through microchannels and consequences on heat transfer

Using carbon dioxide $CO_2$ as a refrigerant fluid has become promising again. It is also used in multiphase liquid-vapor flows in heat exchangers for industrial applications, but references to $CO_2$ in micromachined compact heat exchangers are rare. In such microchannels, there is a lack of visual observations of the possible flow regimes. But such microflows would enhance heat transfer in cases where high thermal fluxes should be dissipated. It is crucial to understand the relationship between two phase flows of $CO_2$ inside microchannels and heat transfer. Our team has performed microfluidic reactors making possible a direct observation of $CO_2$ microflows. Inside a dedicated high pressurized $CO_2$ set up, we have already characterized two microreactors having hydraulic diameters around 180 micrometers and exposed to heat fluxes up to 80 kW/m$^2$. We have recorded for the first time a decrease of heat transfer together with an increase of the mass flow rate, at a fixed weight of vapor. The proposal aims to explore now a large range of configuration, scrutinizing the respective roles of hydraulic diameters, capillarity, mass flow rate, and vapor weight on the flow regime and on the heat transfer. The objective is to complete thermohydraulics of boiling of $CO_2$ inside microchannels.




We are looking for high level graduated applicants in physics, energetics or fluids mechanics, able to fully engage in research, motivated to commit in new experimental programs in which they will have growing responsibilities, in order to make them succeed, within the kind supervision of the scientific management team.

Contacts :
Pr F. AYELA : frederic.ayela@univ-grenoble-alpes.fr
Dr D. COLOMBET : damien.colombet@univ-grenoble-alpes.fr
LEGI : https://www.legi.grenoble-inp.fr/web/spip.php?article189