Minicolloque n° 13 □ **Poster**

Study of diesel flow in microfluidic chip at low temperature

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There are different situations in which oils can crystallize, when cooled by climatic conditions, and lead to damaging clogging mechanisms. The two most common situations are when they are transported in pipelines or injected into engines. The mechanisms responsible for crystallization and clogging depend on several parameters: oil composition, physico-chemical properties of the walls, presence or absence of additives, confinement, presence of impurities,... to cite a few. Generally, the crystallization properties of oils are characterized using macroscopic analytical tools. An important issue is to understand the formation of the plug at onset. We propose in this work to use micromodels [2] in order to study an oil flowing below its crystallization temperature.

First of all, we have developed a system allowing to generate a homogeneous temperature on an observation area under flow conditions, thus allowing to couple transmission microscopy visualization with measurements such as pressure drop and flow rate. This system allows to reach negative temperatures and to generate a temporal control of the temperature profile. Thanks to this system, we can study the crystallization of oils as a function of temperature and cooling rate under static and/or flow conditions. In the presentation, we will address the issue of crystal polymorphism by taking into account different parameters such as the effect of the cooling rate [3], the value of the temperature at the lowest step [4] or the presence of additive molecules [5]. We will then present the link between this polymorphism on the clogging effects.

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[5] K. G. Libbrecht, *Rep. Prog. Phys.*, 68, 855-895 (2005)

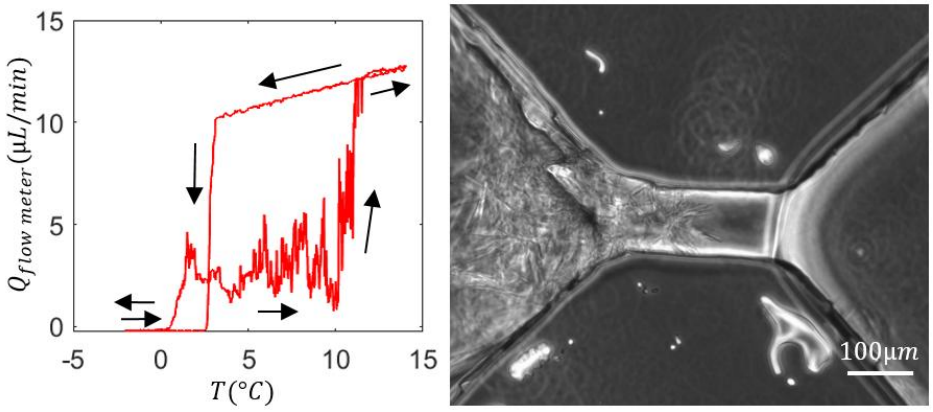

Figure 1 : On the left : Plot of the flow rate of an oil in a microfluidic channel as a function of the temperature. On the right : Photo of an oil plug at the inlet of a channel constriction at -2°C.