USING BUBBLES AS FILTRATION MEMBRANE

LABORATORY : Institut Lumière Matière

LEVEL : M1 / M2
TEAM(S) : LIQ@INT

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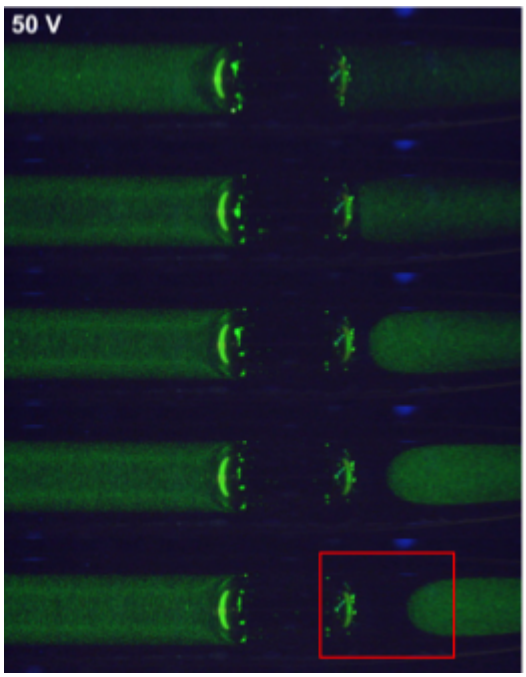
KEYWORD(S) : Microfluidics / bubble

SCIENTIFIC CONTEXT :

One of the consequences of climate change is ensuring access to clean drinking water, free from all impurities. Beyond geological extraction processes (such as groundwater), two conventional methods are employed: distillation and filtration through nanometric membranes. Both processes have significant energy costs, whether for water evaporation or mechanical pushing through nanometric membranes. Additionally, these membranes are economically expensive, and one of the problems is their fouling.



Soap bubble (1mm) trapped in a capillary subjected to an electric field.

MISSIONS :

Here, we propose a new filtration process using elongated soap bubbles trapped in a capillary (see figure). The thin film between the bubble and the capillary serves as the filtration membrane. We observed that by applying an electric field on either side of the capillary, colloidal particles could be filtered, provided that the electric field is not too intense.

In this internship, we aim to optimize this process by exploring two approaches. Firstly, when the electric field is significant, filtration is very fast but less selective. At a low field, selectivity is excellent but slow. We intend to create a phase diagram to understand how to manipulate these factors based on the size of colloids and bubbles. Secondly, we want to implement processes with multiple bubbles to eventually sort particles of different sizes.

OUTLOOKS :

Application to the Ecole doctorale for PhD funding is possible.

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