Representative behaviour of nanoplastics in a salinity gradient: a micro-chip to go one step further?

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Evaluating plastic nanoparticles toxicity in marine waters is a challenge considering their tendency to aggregate in presence of high ionic strength. In this study we evaluate the behavior of **environmentally relevant nanoplastics** in different salted medium before exposition of organisms. Aged nanoparticles obtained from polystyrene material (nano-PS) and from environmental plastic debris sampled on Caribbean littoral were used for this purpose.

We develop unprecedented methods to representatively disperse those nanoplastics into a **salinity gradient** by designing and using a **microfluidic device** (MD).

Micro-channel is filled by salted solution in one inlet, and nanoplastics dispersion in the other. At the two outlets, evolution of size distribution, fractal dimension and stability is investigated using *in situ* dynamic light scattering, static light scattering, and laser induced breakdown detection.

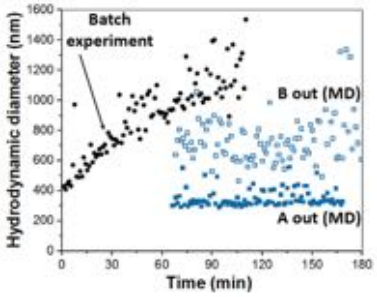

Figure 1 : Aggregation kinetics of aged nano-PS in batch or dynamic experiment (MD) in a gradient of NaCl.

The hydrodynamic conditions in the microchannel seem to induce an aggregation pathways governed by Reaction-Limited-Cluster-Aggregation (RLCA) mode. To the contrary, in the classical batch approach i.e. dropwise addition of NaCl solution into the nanoparticles dispersion and manually stirred, aged nanoplastics present a characteristic aggregation pathway of Diffusion-Limited-Cluster-Aggregation (DLCA) mode.