ARCTIC 2023 – PROJECTS SELECTED FOR IMPLEMENTATION

NANOPLARTIC-25

PI, LEAD INSTITUTION

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ABSTRACT

The recent communication of the AMAP initiative declares that "*Litter and microplastics must be monitored in the Arctic environment to understand their sources, transportation patterns, spatial and temporal trends, and possible impacts on the Arctic...*". The high levels of plastics in the Arctic, where the direct human impact is extremely low, are explained by the long-distance transport of plastics with air and ocean currents. Based on our recent works, nanoplastics could represent an essential part of the plastic in the Arctic that was not yet addressed. However, there is no data or scientific proof of nanoplastics in the Arctic due to the lack of analytical strategy to characterize them. In addition to global sources, other relevant source points of plastic and particle pollution have been identified. From our previous campaign with the Commandant Charcot (2022) at Ittoqqotoormiit, we realized that Inuit communities are also highly exposed to the local source of anthropogenic nanoparticles from the uncontrolled house-wastes burning.

What is the distribution of nanoplastics in the Inuit Communities' environment? What are the transportation pathways of nanoplastics in the Arctic Ocean? What is the impact of nanoplastics on living organisms and the food web? To answer these questions, the expedition's objective proposed here is to document the presence and impact of nanoplastics and anthropogenic nanoparticles in the Inuit Communities and evaluate the transportation pathways of these emerging contaminants in the Arctic Ocean. **We asked for two berths in the itinerary: CC250523 (or CC220623), CC100723 (or CC110823), and CC110923.** During the expeditions, we will deploy our analytical strategies, the *autonomous ultrafiltration system for nanoparticle fractionation and detection (AUSNP),* to concentrate and identify the nanoparticles from various matrices in low volume (10 mL): sea ice, snow, and sea-water that will be collected using the in-situ pump of the vessel as well as the different facility (snowmobile, ice corer) to assess to the sampling point. The final volume (10mL) of concentrated nanoparticles will be directly characterized in size, shape, and number-based onboard and then stored at -20°C until reaching the TAKUVIK laboratory. In TAKUVIK, we have developed high-resolved analytical methods to detect and identify trace concentrations of nanoscale plastic materials in complex environmental media such as field flow fractionation coupled with light scattering and mass spectrometry detectors (ICPMS- and Py-GC/MS-MS). These methods allow size fractionation and characterization of colloids from dilute aqueous samples and the carbon-based and elemental composition. In addition to the scientific communication that we plan to publish on the results, we will propose showing, demonstrating and participating ("open science" program) our sampling and characterization strategy for nanoplastics to the cruise passengers **and the Inuit community**. In the laboratory and some dedicated

space, we will present our work on posters showing our first results obtained in 2022. **The posters will be produced in French, English, and Kalaallisut**. Different outreach activities will be planned, such as a large conference and short presentations (10 minutes) called “Recap” showing our day-by-day activities and our first observations.