Mismanagement of plastic waste has emerged as a global environmental challenge. Every year, kilo tonnes of plastic litter is estimated to enter the oceans via rivers or coastal areas. However, there is a discrepancy between the amount of plastic that is found in the oceans compared to the amount of plastic waste that is expected to leach in; part of the plastic is missing. [1] A significant portion of this missing plastic is hypothesized to result from plastic degradation products, so-called micro- and nanoplastics. Although scientist are able to image and characterize microplastics (commonly defined as particles with a size of 1 um - 5 mm), this is not the case for nanoplastics (< 1000 nm). Due to their small size, they often fall below the detection limits of commonly available collection and identification methods, while those are crucial to assess the behaviour of nanoplastics in aquatic systems and their toxicology. [2]

To extend our knowledge on nanoplastics, the aim of this project is to characterize their chemical composition, size and structure by using a toolbox of various spectroscopic methods, such as infrared spectroscopy (IR), confocal fluorescence microscopy (CFM) and grazing-incidence X-ray fluorescence spectroscopy (GI-XRF).[3] To be able to perform correlative micro-spectroscopy experiments, sample preparation is of utmost important. Therefore, another important aspect of this research project is the development of sampling and concentration protocols for the characterization of aquatic, environmental samples for correlative analysis.

This research project is part of a consortium with a set of complementary expertise, in which chemistry, physics and biology are bridged. In this interdisciplinary team we work closely with researchers from Utrecht University, Leiden University, NIOZ, and the University of Amsterdam.