Analysis and Characterization of Microplastics in Marine Environment

Rui Sousa, Maria Paiva, Inês Machado e Paulo E. Lopes
University of Minho, Institute for Polymers and Composites, Guimarães, Portugal

Introduction

Microplastics (MPs) are released in the environment in their original form (fibers, microbeads, etc.) or by degradation of macroplastics abandoned in the environment.

The present work is a contribution to the definition of a methodology for the analysis of microplastics present in freshwater collected from the estuary of Cavado river, in the north of Portugal (Figure 1). It contributes to the design of a procedure that covers sample stabilization, preparation and analysis.

Collection sites

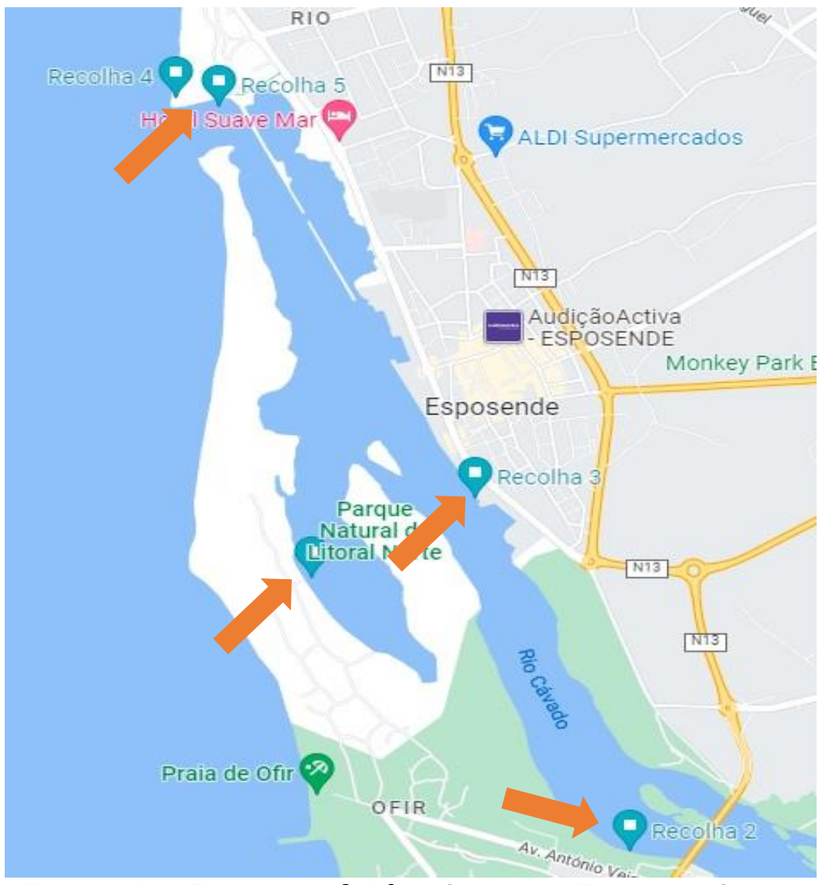


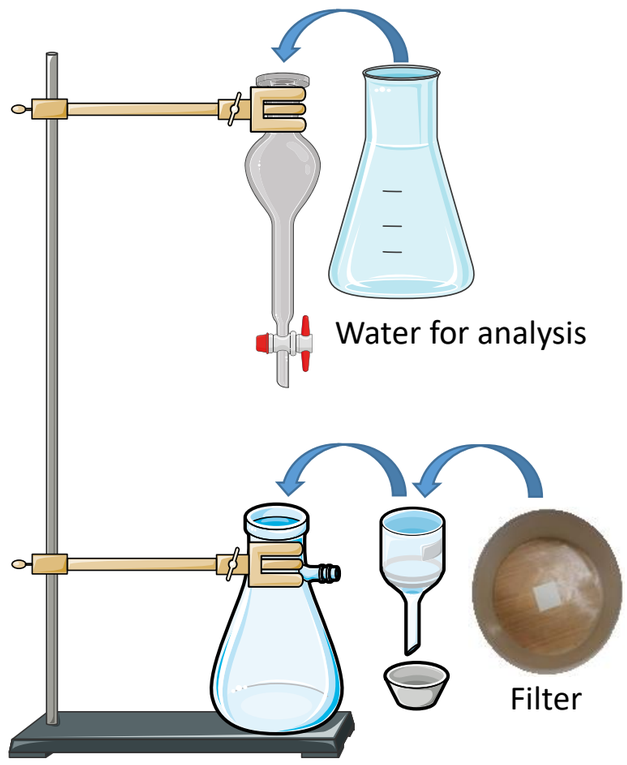
Figure 1 – Estuary of Cávado river, Esposende, Portugal; collection sites indicated by arrows.

Conclusions

Two types of filters were tested for the analysis of MPs in water: Si wafer filters and glass fiber filters. The flat surface of the Si filters facilitates optical detection of the MPs, however the filter surface was altered after filtration of pure water (blank test), complicating MP detection. Also, Si filters are brittle and difficult to handle. Glass fiber filters are easy to handle but have a rough surface that complicate optical detection of the MPs. Ongoing work aims at improving the optical detection of MPs and decreasing the processing time.

Materials and methods

Water samples were collected in 500 mL Schott glass bottles and were stabilized by adding H_2O_2 15% (w/v) at 1:1 volume ratio. The filtration setup was based on dropping 200 mL of the solution through a 10 mm^2 glass fiber filter with 0.7 μm porosity (Scheme 1). The filters were dried at room temperature in a glass Petri dish until they were analyzed by Raman spectroscopy. The analysis was carried out on a Raman spectrometer Horiba LabRAM HR Evolution microscope (Figure 2), equipped with the software Particle Finder and KnowItAll database.



Scheme 1 – Filtration setup

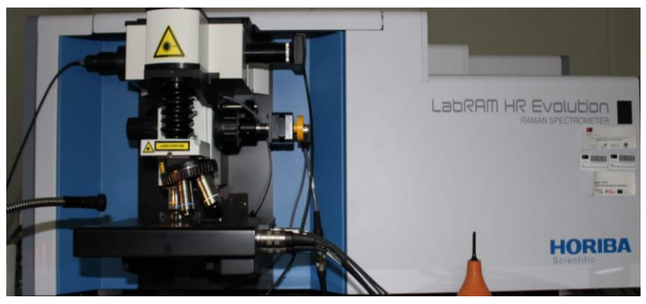


Figure 2 – Raman Microscope

Results

Si wafer filters

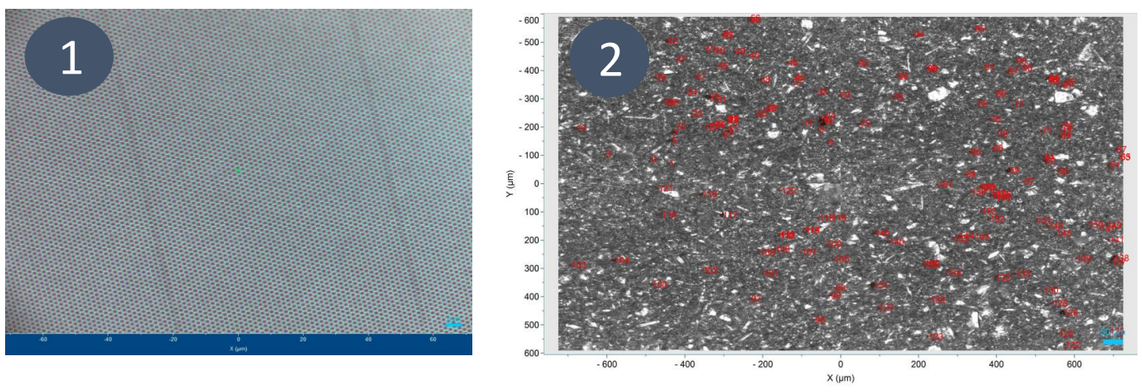


Figure 3 – Silicon wafer filter surface before (1) and after (2) filtration.

Glass fiber filters

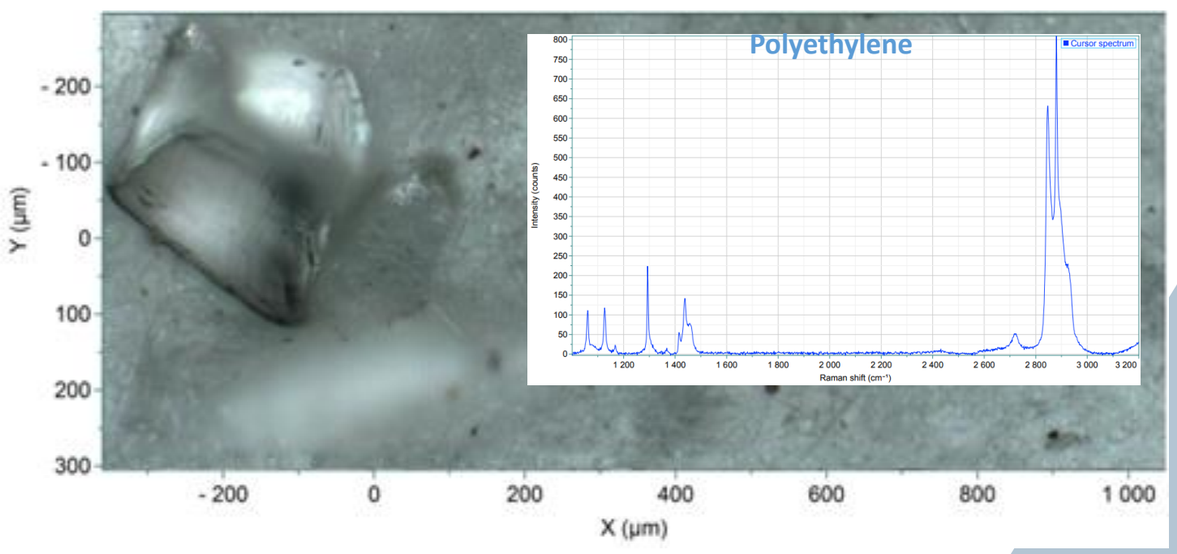


Figure 4 – Image of a MP fragment (polyethylene) and corresponding Raman spectrum.

To date the analysis carried out found **1 MP** particle in a total of **1.2 L of collected water.**

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