

## **First evaluation of continuous flow centrifugation as a novel straightforward and non-size-discriminating sampling technique for microplastic in waters**

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Microplastic (MP) has been detected in a plethora of environmental systems and organisms. Different kinds of sampling, sample processing, e.g. density separation, chemical and enzymatic sample purification, and detection approaches have been applied. Despite some recommendations for these steps from organizations such as the NOAA or the MSFD Technical Subgroup on Marine Litter (EU), there is no standard operation procedure for MP sampling. Many studies on MP abundances in environmental samples do not indicate a sound methodological validation of the applied methods and procedures. Recoveries for the overall applied procedures, especially for the sampling process, are mostly not provided or, if yes, only the particle-sizes given by the producers are stated. From author's point of view sampling still poses the weakest link in the analytical process related with environmental MP analysis, since most studies apply size-discriminating sampling techniques. As small MP bears the highest potential of biological uptake, translocation and adverse effects, it is highly important to quantitatively sample these particles. The present study provides an approach to eliminate the trade-off between clogging-problems when using small meshes (10 - 50  $\mu\text{m}$ ) for small MP sampling and the size-discrimination of high volume MP sampling employing larger mesh sizes (100 - 333  $\mu\text{m}$ ). For the validation of the instrumental setup, five polymer types (referring to 73% market share) were employed namely polyethylene, polyethylene terephthalate, polypropylene, polystyrene, expanded polystyrene and polyvinylidene chloride MP powders. These respective particles covered a broad size range from 1  $\mu\text{m}$  to 1 mm and a density range from 0.94  $\text{g mL}^{-1}$  to 1.63  $\text{g mL}^{-1}$ . Recoveries ranged between 95.0%  $\pm$  2.3% and 99.1%  $\pm$  0.3% for virgin powders. For powders deployed in river water for 40 days, recoveries even ranged between 96.1%  $\pm$  0.6% and 99.4%  $\pm$  0.2% (1 *SD* ( $n = 3$ )).