

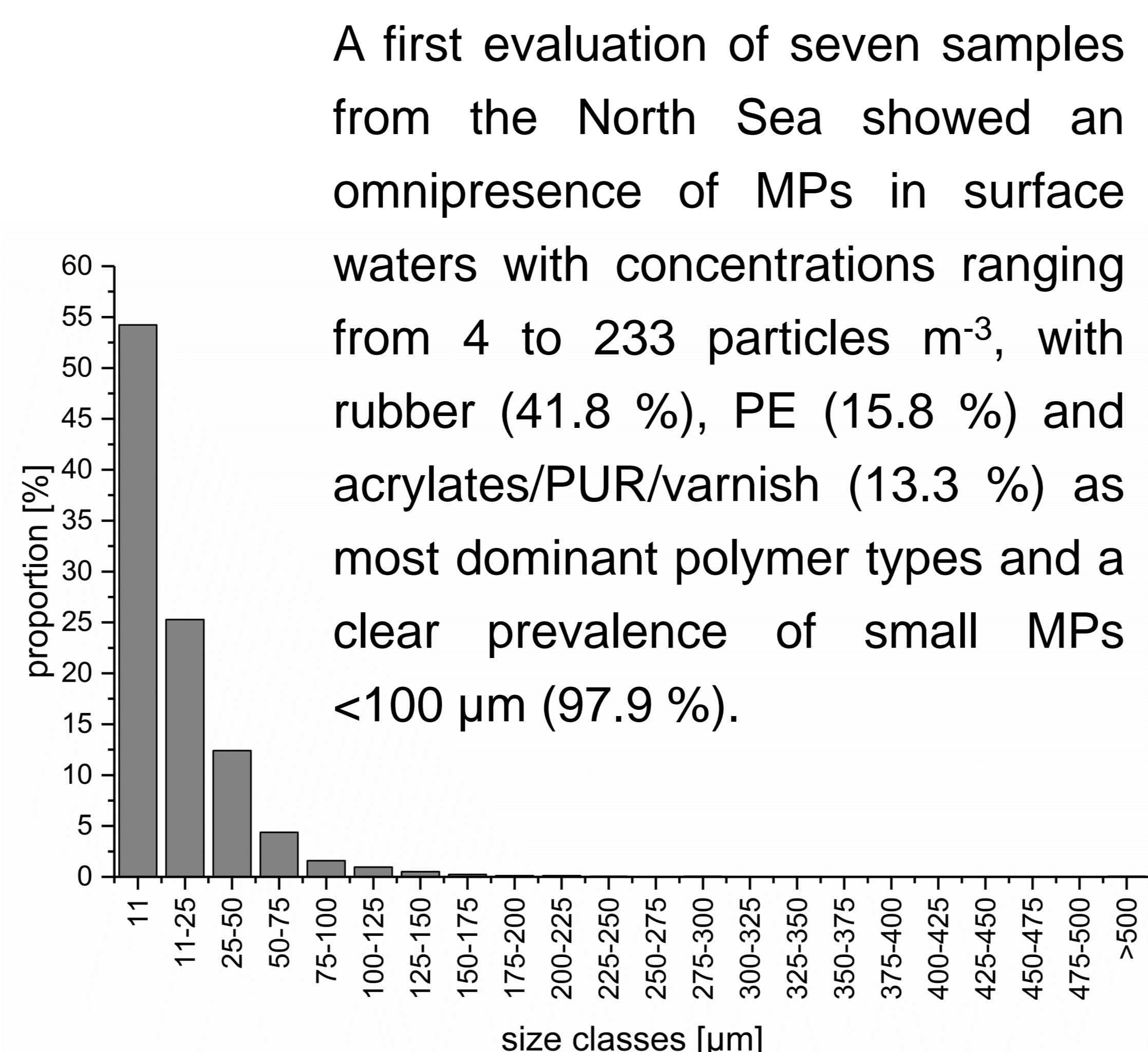
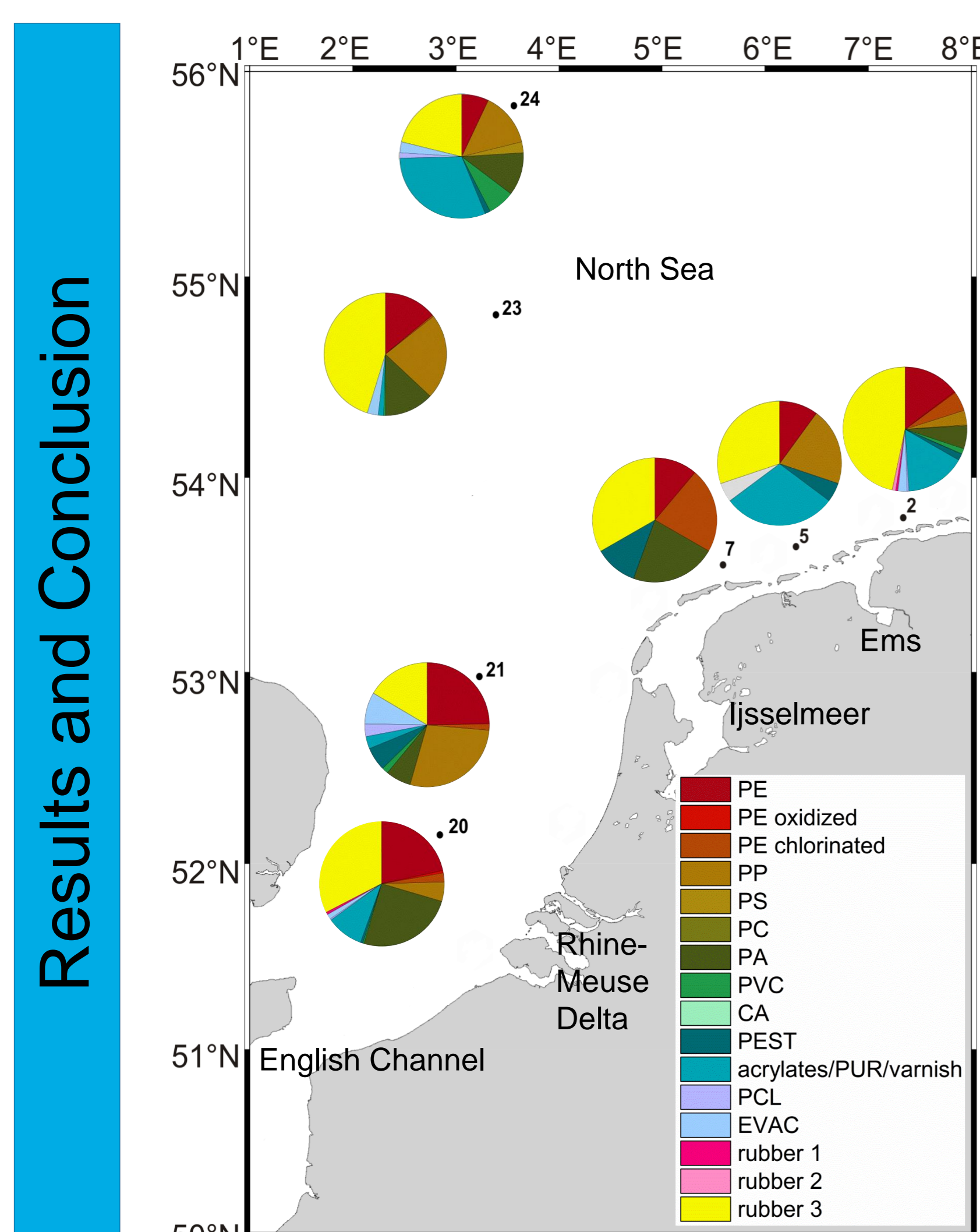
Microplastics (MPs, < 5 mm) have been identified as emerging topic of global concern. Therefore the detection of MP pollution has also been included in the European Marine Strategy Framework Directive (MSRL, descriptor 10.1.3) [1]. Although monitoring of MP pollution is demanded there are still knowledge gaps on how much MPs are out there, because the required analytics are challenging and no standard operating procedure (SOP) does exist so far. Environmental samples i.e. surface water samples contain next to MPs a high amount of natural organic material. The extraction of these MPs from the environmental matrix is crucial to enable a solid identification especially of small of MPs (11-500 μm) with state-of-the-art methods like micro Fourier transform infrared (μFTIR) spectroscopy.

In the framework of JPI Oceans BASEMAN project several innovative approaches were developed and processes optimized to gain insight into the extend of MP pollution in North Sea surface waters.

Sampling and Extraction

Detection

polyethylene	polyethylene oxidized	polyethylene chlorinated	polypropylene	polystyrene	polycarbonate	polyamide	polyvinylchloride	cellulose chemical modified	nitrile rubber	polyester	acrylates/polyurethane/varnish	polysulfone	polyetherketon	polychloroprene	polyisoprene chlorinated	polylactide acid	polycaprolactone	ethylene-vinyl acetate	polyimide	polyoxymethylene	polybutadiene	acrylonitrile-butadiene	rubber 1	rubber 2	rubber 3
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A first evaluation of seven samples from the North Sea showed an omnipresence of MPs in surface waters with concentrations ranging from 4 to 233 particles m^{-3} , with rubber (41.8 %), PE (15.8 %) and acrylates/PUR/varnish (13.3 %) as most dominant polymer types and a clear prevalence of small MPs <100 μm (97.9 %).

- ☆ Successful application of a highly efficient enzymatic-oxidative purification in newly developed MP reactors to approach challenging and elaborate preparation of samples
- ☆ Prevention of overloaded filters via FlowCam measurements
- ☆ Cutting-edge analysis with μFTIR spectroscopy and an automated analysis to produce valid data on polymer composition, abundance and size distribution with an identification down to a size limit of 11 μm

[1] European Parliament Council (2008) Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive).1-22
 [2] Gerdtz G (2017) Reaktor zur enzymatischen Mazeration biogener Bestandteile einer Partikelprobe und Verwendung des Reaktors, DE102016123324 (B3)
 [3] Löder MGJ, Imhof HK, Ladehoff M, Lösche L, Lorenz C, Mintenig S et al. (under revision) Enzymatic purification of microplastics in environmental samples.
 [4] Primpke S, Lorenz C, Rascher-Friesenhausen R, Gerdtz G (2017) An automated approach for microplastics analysis using focal plane array (FPA) FTIR microscopy and image analysis. Anal Methods 9:1499-1511