A critical assessment of visual identification of marine microplastic using Raman spectroscopy for analysis improvement - DTU Orbit (03/04/2019)

Identification and characterisation of microplastic (MP) is a necessary step to evaluate their concentrations, chemical composition and interactions with biota. MP ≥10 μm diameter filtered from below the sea surface in the European and subtropical North Atlantic were simultaneously identified by visual microscopy and Raman micro-spectroscopy. Visually identified particles below 100 μm had a significantly lower percentage confirmed by Raman than larger ones indicating that visual identification alone is inappropriate for studies on small microplastics. Sixty-eight percent of visually counted MP (n = 1279) were spectroscopically confirmed being plastic. The percentage varied with type, colour and size of the MP. Fibres had a higher success rate (75%) than particles (64%). We tested Raman micro-spectroscopy applicability for MP identification with respect to varying chemical composition (additives), degradation state and organic matter coating. Partially UV-degraded postconsumer plastics provided identifiable Raman spectra for polymers most common among marine MP, i.e. polyethylene and polypropylene.

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