**Microplastic as potential environmentally relevant sorbents for organic contaminants**

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Over recent years, the spread of plastic debris has become an issue of increasing public concern as well as among scientist and regulators. The production of plastics has been continuously increasing and reached 300 Mt in 2013[1] Meanwhile, the input of these materials into the environment from both single-point and diffuse sources has raised questions regarding their impact on ecosystems. Once primary plastic materials are introduced into the environment they are highly resistant to mineralization, although the large primary fragments will break down into smaller particles known as microplastics. While so far the majority of studies has investigated the occurrence of microplastics in marine environments, there have few but growing number of reports on the occurrence of plastic debris in non-marine aquatic ecosystems, indicating a quantitatively similar degree of contamination in these systems.

The input of microplastics presents a potential hazard to environmental ecosystems resulting from entanglement or ingestion of these particles by organisms[2]. In addition, there has been a growing concern about an “indirect” effect, which results from the plastic particles acting as a contaminant carrier[3]. To this end, sorption of organic compounds by microplastics is an important process as it may affect the compound distribution in sediments and aqueous phases. For example, strong sorption of organic compounds by microplastics, even at comparable low sorbent concentrations, could consequently result in a decrease in the (free) available aqueous concentration of these compounds in sediments. Thus, a detailed knowledge of sorption properties of microplastics is of crucial importance and will significantly contribute to the discussion on the potential relevance of the presence of microplastics in the environment.

To date, research on sorption by microplastics mainly focusses on the investigation of individual sorption mechanisms by a rather limited number of sorbate compounds. As a consequence, there are significant gaps in knowledge with respect to a fundamental and systematic understanding of the relevant sorption mechanisms. Recently observed differences in sorption strength between different sorbates could not be ascribed purely to a sorbent size effect, but may also be affected by individual interactions[4]. Consequently, both polymer properties and sorbate-specific factors need to be considered for a comprehensive understanding of the relevant interactions and their contribution to overall sorption.

To this end, sorption batch experiments of carefully selected polymer sorbent materials and probe sorbates based on their physico-chemical properties were carried out. The influence of both molecular composition of sorbents and functionalization of sorbates on sorption was considered to achieve a better understanding of the interactions between microplastics and organic compounds, which is of crucial importance from a environmental risk assessment perspective.

[1] Plastic Europe 2014. [2] Wright, S.L.; Thompson, R.C.; Galloway, T.S., Environ. Pollut. 2013, 178, 483-492. [3]. Rillig, M.C., Environ. Sci. Technol 2012, 46, 6453-6454. [4] Guo, X.Y.; Wang, X.L.; Zhou, X.Z.; Kong, X.Z.; Tao, S.; Xing, B.S., Environ. Sci. Technol. 2012, 46, 7252-7259.