



Contribution ID: 79

Type: **Talk (20 min + 5 min discussion)**

Scattering Studies on Model Microplastic Flocculation

Thursday 5 December 2024 15:00 (25 minutes)

Microplastics have become a pressing issue due to their accumulation in aquatic and terrestrial environments and their presence in the food chain. In this talk, I will present the studies undertaken to flocculate a model microplastic system, viz., polystyrene latex suspension. This system, comprised of ~140 nm polystyrene spheres (microplastic) dispersed in water, was flocculated using Nanofloc® (VTA Technologie GmbH, Austria). The polystyrene particles serve as analogs to the microbeads in commercial face washes/scrubs and Nanofloc® induces flocculation. The polystyrene particles are negatively charged, while Nanofloc® solution is positively charged. A series of polystyrene colloids was prepared, and their flocculation was investigated using scanning electron microscopy (SEM), light scattering, and small-angle neutron scattering (SANS). The flocculation is instantaneous upon the addition of Nanofloc®. SEM image of the suspension, which exhibited complete flocculation, shows that the Nanofloc® uniformly covers the polystyrene particles with an interconnected network of compact and denser flocs. SANS studies were carried out as a function of polystyrene and Nanofloc® concentration. The scattering data for the particles with Nanofloc® was fitted using the models for fractal aggregates. The results of the study will be presented with details on model fitting, diffusion process, and the kinetics of flocculation.

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Session Classification: Soft Matter

Track Classification: Soft Matter