Developing Novel Methods for Isolating and Identifying Microplastics and Nanoplastics in New York City's Waterways

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As the production and consumption of disposable plastic products are increasing, plastic pollution has become a pressing environmental issue and public health concern. After being exposed to solar radiation, mechanical forces, and biological processes in the environment (Li et al., 2021), plastics are degraded and broken into microplastics (<5 mm). However, microplastics can be further degraded into nanoplastics (<1μm), which have the potential to cross biological membranes and adversely affect human health (Llorca & Farré, 2021). Thus, microplastics and nanoplastics (MNPs) are of particular interest in this study. Previous studies have proposed methods for the separation and determination of MNPs in water samples, but more novel, efficient, and effective methods are needed to advance the research on MNPs. This study provides a reliable method for extraction, separation, and identification of nanoplastics in ten New York's waterways using density separation and Raman Spectroscopy. Based on Raman Spectroscopy, the microplastics in New York's waterways were identified to be mostly polyethylene (PE) and polypropylene (PP). Ongoing research is being conducted to detect and quantify nanoplastics using Stimulated Raman Spectroscopy (SRS).