Analytical Pathways for Micro- and Nanoplastic Detection in Environmental and Biological Systems

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Within the past decade, research focused on attempting to understand the interaction of micro- (1 µm – 5 mm) and nanoplastics (< 1 µm) with various marine animals has been of increasing interest. With this growing interest has come a growing need to optimize sample preparation and analytical protocols that facilitate their detection in complex environments. In an effort to address this need, my research focuses on the use of micro- and nanoplastic particles with and without a fluorescent label for detection with Raman Spectroscopy as well as light and electron microscopies. Nanoplastic particles composed of polystyrene and poly(ethylene terephthalate) were spiked into seawater and used to assess the viability of Raman Spectroscopy for their detection. Additionally, microplastic particles of poly(ethylene terephthalate) and polypropylene with sizes < 300 µm were prepared and used to develop a protocol that facilitated the use of correlative microscopy and spectroscopy to detect the microplastics after their ingestion by medusa of the jellyfish *Cassiopea andromeda*. This work stands as a proof of concept for various methodologies that have a broad range of potential applications within the plastics field.

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