



UMD Department of Chemistry & Biochemistry
Fall 2021 Seminar Series
Friday, October 22, 2021
Chem 200 ~ 3:00 p.m.

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HOST ~ DR. STEVEN BERRY**

Plastics in the Environment: The Impact of Weathering on the Fate and Transformations of Aquatic Plastic Debris

Plastics are a ubiquitous part of everyday life and a central challenge in the environment. Environmental stresses such as sunlight, temperature fluctuations, wet/dry cycling or microbial forces affect the longevity or degradation of plastics. Assessing the fate of plastics under these stresses allows us to accurately predict the service lifetime of plastics used in infrastructure (e.g., power cabling/solar panels) or evaluate the extent of the plastic pollution problem. This talk details the work of quantifying photochemical and thermal degradation mechanisms of plastics commonly found in aquatic plastic debris: polyethylene, polypropylene and polyethylene terephthalate. In this talk, I will focus on the development of a methodological framework for characterization of the rates and yields of the chemical transformations within polymers, moving beyond traditional materials characterization techniques. Additionally, we quantified the formation of microplastics upon photochemical weathering, applying our understanding of the chemical photo transformations. Beyond the transformations of the plastics, we also began to unravel the role plastics and plastic weathering play on the ecosystem health by monitoring the sorption of model micropollutants to weathered plastics. Ultimately, this work strives to quantify the transformations and fate of plastics so as to design a predictive model of plastic behavior in the environment, which has implications for accurately assessing the burden of plastics on the environment but also allows for new polymer design.