

# An experimental study on degradation and fragmentation of marine plastic debris

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Marine contamination due to plastic debris, especially microplastics, is attracting worldwide attention at the present time. It has already been reported that microplastics are present over the world's ocean, but the process of their formation has not been clarified in detail. In this study, we aim to elucidate the process in which plastics drifting on the surface of the sea are degraded by ultraviolet rays and fragmented by physical processes such as waves. We attempt to reproduce the degradation and fragmentation processes in a laboratory experiment. First, an ultraviolet irradiation experiment was conducted. The ratio of the ultraviolet intensity between a high-pressure UV lamp irradiated and sunlight was measured under the sunny, cloudy, and rainy conditions. Thereafter, plastic (polyethylene without additives) pieces of the same size were irradiated with ultraviolet rays under a high-pressure UV lamp. The degraded plastic pieces were entered into a plastic tube with seawater and sand, which was rotated to represent motion by waves in shorelines to fragmentize. The change of fragmentation rate of the plastic pieces will be examined by varying the irradiation time and the rotating times, respectively.

Keywords: microplastics, rubbish, ultraviolet ray