A Study on the Removal Method of Microplastic Using Ambrosia trifida

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Marine pollution of microplastics has been a problem, but it has been receiving more attention as a serious environmental issue recently since it was included in the UNEP's international environmental issues in 2014. In addition, because humans are at the top of the food chain and consume a large amount of microplastics through seafood, microplastics causes serious harm. In this study, a filter that absorbs and removes microplastics using porous xylem of herbaceous plants was made using the ecological disturbance species, Ambrosia trifida (giant ragweed). This species is more than 90% filled with porous water pipes, which are bigger than microplastic (PEG) in size. Therefore, a new filter was produced through hydrothermal synthesis by changing the ratio of giant ragweed powder, bone meal, and HMT solution. Even after hydrothermal synthesis, SEM confirmed that the porous structure of the giant ragweed remained. Several filters were made using hydrothermally synthesized materials and zeolites, and experiments were conducted to compare the microplastic removal rates of each filter. The amount of microplastic before and after the filter was analyzed by absorbance determination and mass change. The microplastic removal rate of the hydrothermal compound filter was 95.4% on average, showing a better removal rate than the zeolite filter, which was 93.1%. In addition, it was confirmed that the grass of maple leaf creates a porous structure on the surface of the hydrothermal composite. However, in the process of experimenting with burette filters, the filtration speed was found to be too slow. Thus, a new filter was made using acrylic and cloth. The filtration rate of the produced filter was 2 ml per second, which was 18 times faster than the burette filter.

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