Microplastics, Macro Problem: A Novel Technique to Remove Microplastics from Water Using a Modified Electrostatic Filter

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Microplastics are an increasingly problematic aspect of plastic pollution with an estimated 83% presence in tap water worldwide. Microplastics are under 5 mm in size and circulate oceans, harming marine organisms on both physical and chemical levels. Currently, there are no feasible options to remove microplastics from water that are both effective and economical. To solve this, I adapted the electrostatic smoke precipitator design and constructed filters to determine the possibility of using this technique in microplastic removal from water. My hypothesis was that a stronger charge of the electromagnets used would remove more microplastics from water. To test this, I constructed five variations of filters, each having two pieces of mesh attached to electromagnets. Each filter had electromagnets at different strengths, dependent on the number of coils. My hypothesis was proven correct. The data showed the filter with 200 coils on the electromagnets filtered an average of 24.5% of the large microplastics and 14.88% of the small microplastics, while the filter with no electromagnetic strength, removed 1.7% of the large microplastics and 0.6% of the small microplastics. This research proved a way to successfully filter out microplastics from water using pre-existing and low-cost technology. There was a direct correlation between the strength of the electromagnet and amount of microplastics captured. Given that a 9V battery was the power supply used, it is logical that a stronger power source would remove more microplastics. This research shows potential in both commercial and industrial levels, with possible applications in a variety of settings from household appliances to large-scale water treatment facilities.

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