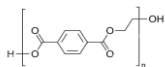


# Ultrasound-Assisted Electrocoagulation for PET Microplastic Removal: Interfacial and Physicochemical Mechanisms in Water Treatment

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## Introduction

- Plastic wastes, consisting of polymers like polyamide, polyethylene, polypropylene, polystyrene, and polyethylene terephthalate, pose a significant threat to water bodies.
- In the UK, water bottles contribute significantly to plastic litter, accounting for 30%.



PET  
Polyethylene terephthalate

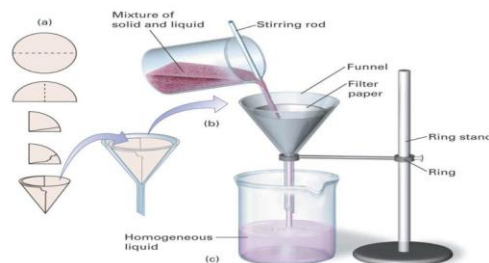
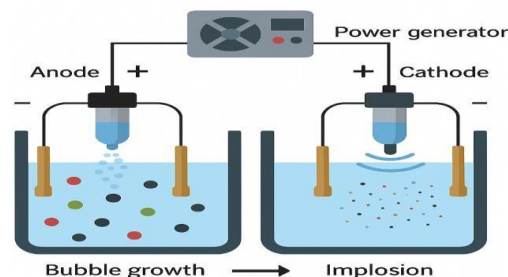
- Combining electricity with soundwave minimise the passivation of electrodes and accelerate the destabilization of microplastic.
- Developing mathematical modelling to increase process efficiency and decrease energy consumption.

## Conclusion

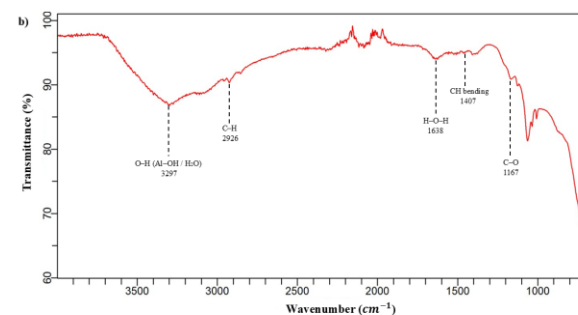
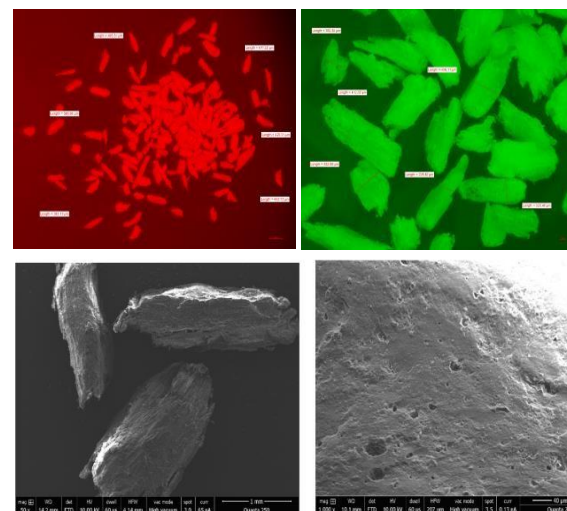
- Combined process of sound waves and electricity efficiently disperses and traps microplastic particles.
- Optimal conditions identified to maximize removal efficiency while minimizing energy consumption.
- The findings highlight the potential of this combined treatment process for real water bodies, including rivers and lakes, with high microplastic contamination.

## Methodology

- PET microplastics are obtained from plastic bottles by cutting, grinding, and sieving.
- Microplastic-laden water is treated using electrocoagulation with aluminium electrodes, improve enhanced by ultrasonic waves to destabilization and aggregation.
- Epifluorescence microscopy is used microplastics before and after treatment.



## Characterization



## Results

- Microscopy confirmed the sieve classification of PET.
- Highest removal efficiency of ~90% was achieved using RSM.
- Optimized conditions for better removal efficiency and lower energy consumption including pH: 8, Current intensity: 2A, Treatment time: 60min, PET size: 250µm, PET concentration: 0.8g/L.

