



Environmental Physicochemical Process and Waste Valorization Lab

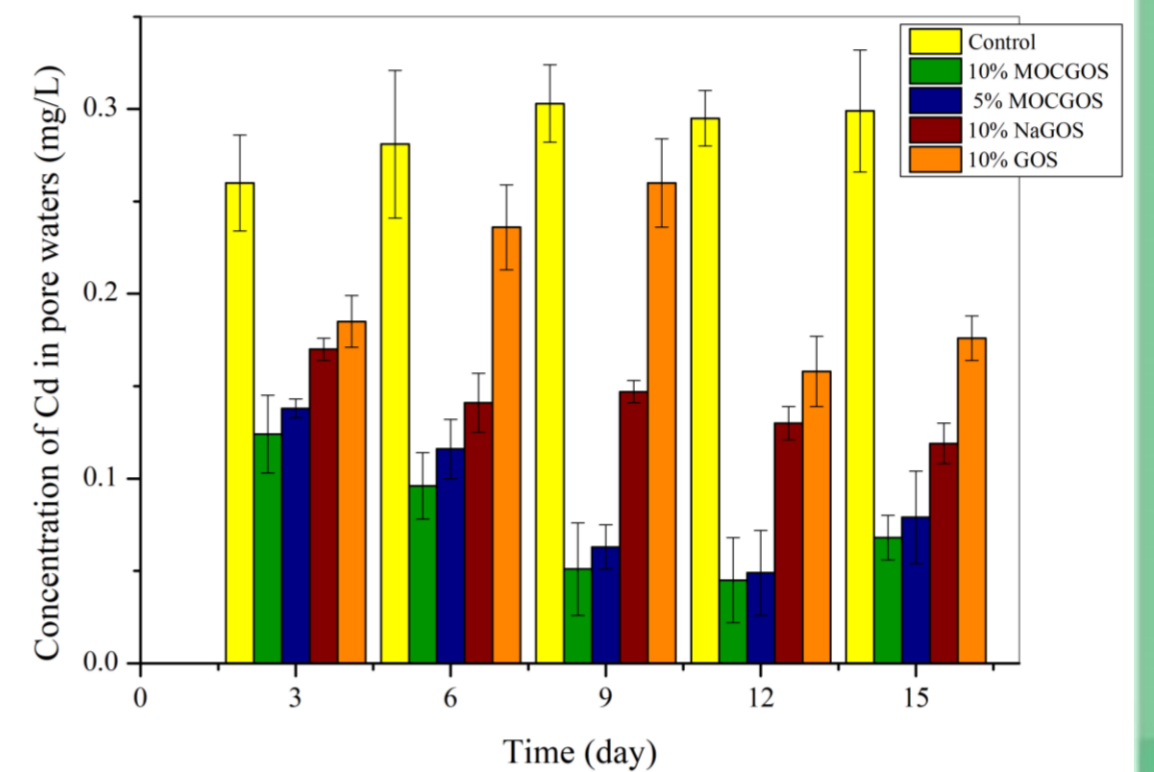
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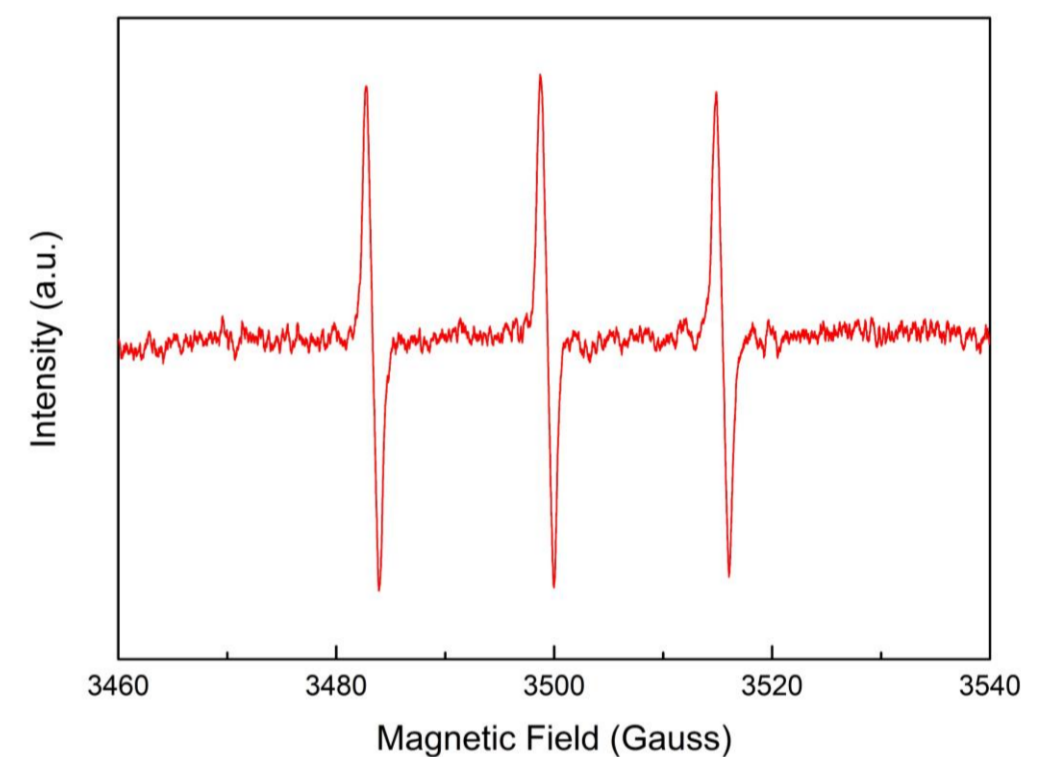


Application of Oyster shell

- Manganese oxide-coated oyster shell powder (MOCOSP) also showed great removal of Cu (86.5%) and Cd (83.2%) in soil incubation experiments.
- Prepare oyster shell materials modified by Lanthanum (La^{3+}) and recover phosphate in wastewater to avoid eutrophication.
- The urea doped on the calcium oxide powder to improve the ability of the composite photocatalytic in removing cationic dye (Methylene blue).
- Using calcined oyster shells to prepare antibacterial materials under different conditions and evaluate the antibacterial effect.
- Detection of reactive oxygen species (ROS) by electron spin resonance (ESR).



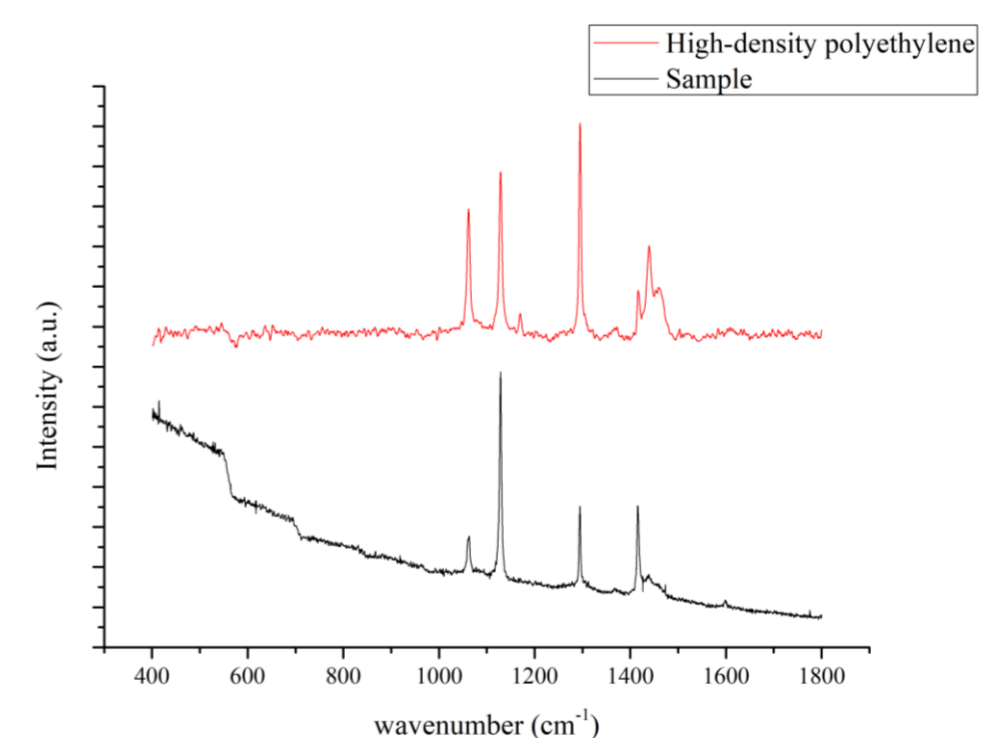
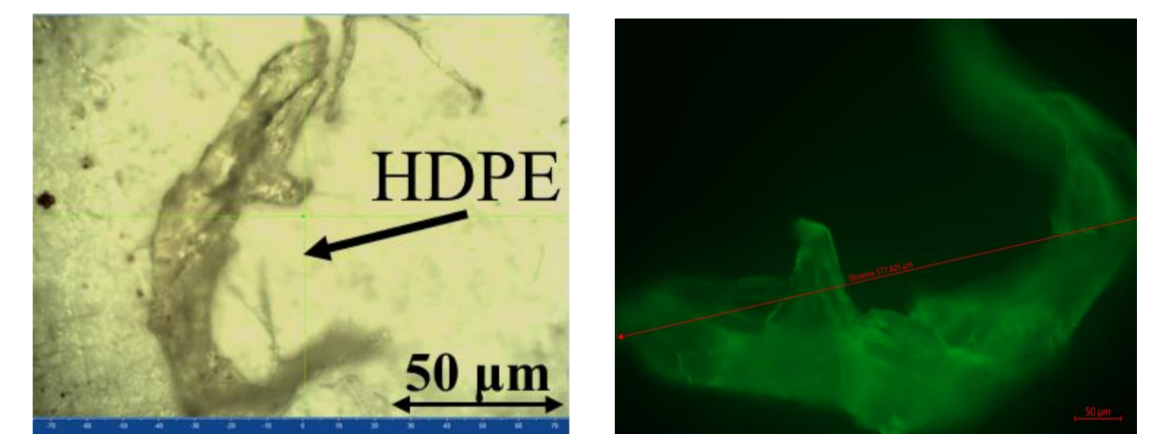
Soil incubation experiment of modified oyster shells



Detection of singlet oxygen ($^1\text{O}_2$) by ESR in oyster shell calcined at 1000°C

Microplastics in Water System

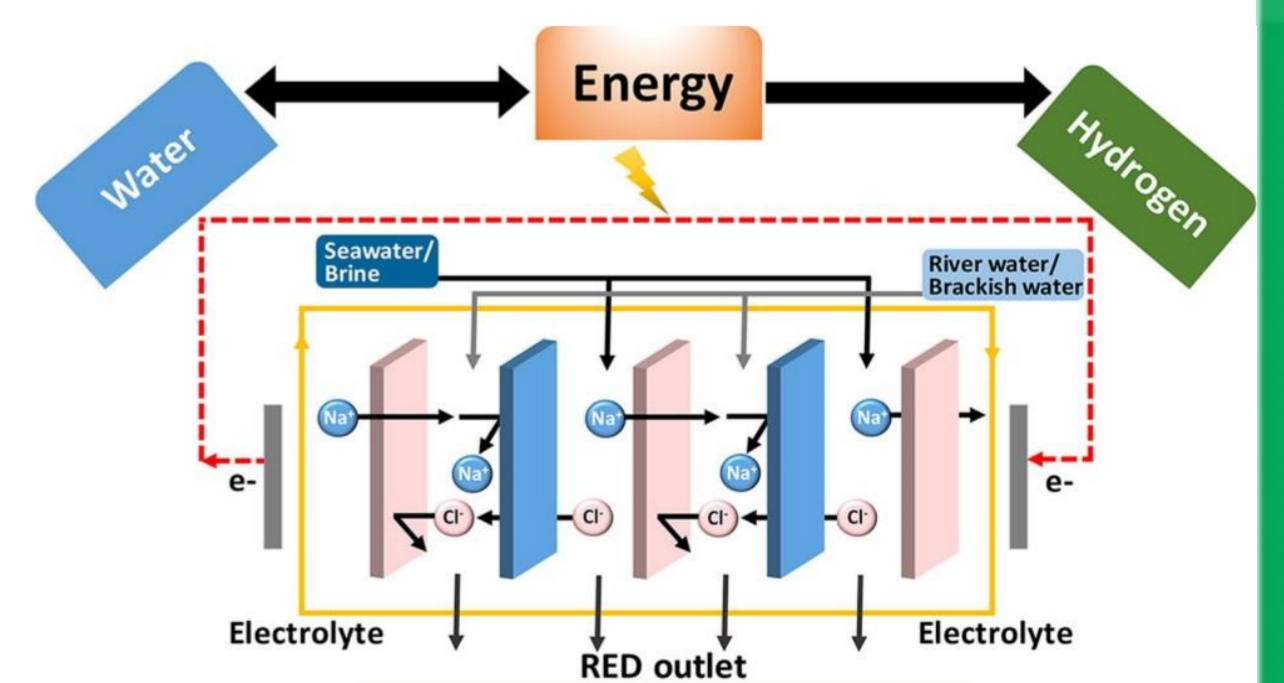
- Development and establishment of efficient methods for analysis microplastics (including sampling, pre-treatment, qualitative and quantitative).
- Long-term investigation of microplastics pollution from the upstream catchment to the reservoir, and analysis of its correlation between abundance, morphological characteristics, spatial and temporal changes.
- Using fluorescence microscopy and high-resolution confocal μ -Raman spectrometer to identify and quantify microplastics in freshwater systems.



Micro-Raman spectra of standard polystyrene and microplastic sample

Blue Energy from Reverse Electrodialysis

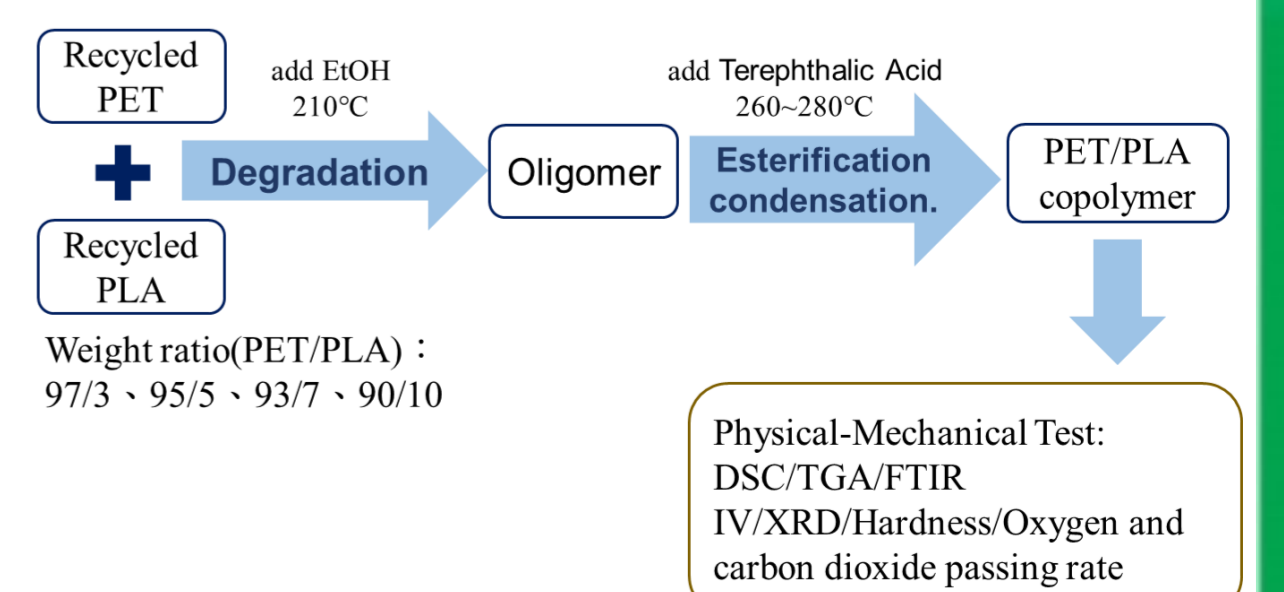
- Electrical energy is extracted from seawater and fresh water using reverse electrodialysis (RED). This method is different from the conventional power generation method in the past, and it generates almost no pollution.
- At the same time, the electric energy generated can also be combined with electrodialysis (ED) to desalinate seawater and achieve sustainable development of resources.



Schematic diagram of RED

Recycle of waste polylactic acid plastic (PLA)

- The modified oyster shell powder, recycled PLA plastic and toughening agent are mixed with twin-screw extruder to develop a fully recycled and decomposable PLA product.
- In view of the trend that PET will be mixed with PLA in the future recycling, chemical recycling process on the synthesis reaction of low-melting PET/PLA copolymers will be developed.



Development of optimization technology for PET/PLA alcoholysis process