

Faculty of Engineering

Summer Research Program 2024-2025

Project Title: Adsorptive Removal of Microplastics Via the Use of Functionalised Graphite and Carbon Nanotubes Derived from Waste Scrap Tyre

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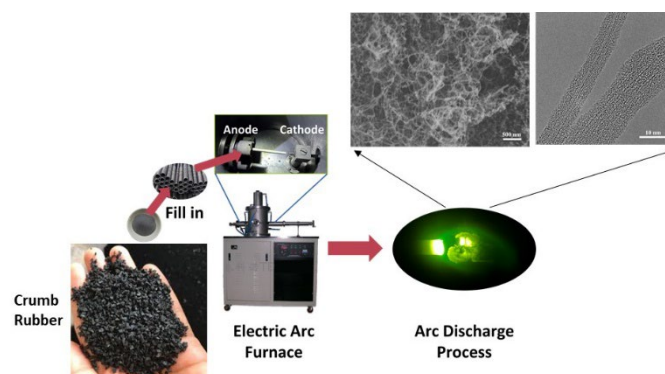
Website profile of project supervisor: <https://www.monash.edu/engineering/clean-solid-fuel-lab/home>

Objective

This project aims to evaluate the physiochemical properties of the graphite and carbon nanotubes derived from waste scrap, and their performance for the adsorption of microplastics within the wastewater. The primary goal of the project is to valorize the waste scrap tyre, which is otherwise simply dumped/stockpiled causing severe environmental impact. In addition, through an appropriate surface functionalization, the graphite and/or carbon nanotubes derived is expected to effectively capture the microplastics within wastewater. This is in turn beneficial in mitigating the environmental concerns of microplastics, another significant pollutant to the ecosystem.

Project Details

Waste scrap tyre with an increased quantity is one of the largest solid wastes within Australia, having an annual yield of around 459,000 tons. Most of the scrap tyre is simply dumped or landfilled, causing significant environmental concern such as spontaneous combustion. Likewise, microplastic is another pollutant that affects the ecosystem significantly. This project aims to functionalise scrap tyre into high-value graphite, and/or carbon nanotube, and further apply it to the removal of microplastics via adsorption. Through this short-term project, student is required to conduct adsorption experiments and the characterization of the fresh/spent/regenerated adsorbents via bench-top facilities such as BET, XRD and FTIR.



Prerequisites

Students from relevant disciplines including Chemical engineering, Environmental engineering and pharmaceutical science are welcomed to apply. There are no specific prerequisite units. However, it would be good if the students have a good understanding on the adsorption science and engineering. Ideally, students who have completed CHE3165 for Separation Technologies would be preferred.

Additional Information

Applicants will be required to attend an interview.