

Purchase of a microwave reactor for technical development on precious metal recycling from Waste Electrical and Electronic Equipment (WEEE)

Waste Electrical and Electronic Equipment (WEEE) is one of the fastest growing solid wastes and is reported accumulating at a rate of ~10 million tons annually in the EU and 20-25 million tons globally. WEEE is a key resource for secondary raw materials in the circular economy given its high concentration of precious and rare elements. At the same time, classified as hazardous waste, WEEE requires proper management due to its heavy metal content.

Traditional pyrometallurgy to process WEEE is energy intensive, requires high investment and has many environmental impacts. Nowadays, solution based mild extraction condition triggering precious metal dissolution is highly competitive, which appears to be a greener solution to process WEEE and improve its sustainability of the circular economy.

The proposed project will directly target the current challenges of WEEE through establishing reliable and widely applicable procedures to determine precious metal content, which will serve as a basis for economic calculation and life cycle assessment of WEEE and developing high throughput screening conditions to optimize precious metal extraction process, which will ensure an efficient, economic and environmentally friendly operation.

A state-of-the-art microwave reactor, which operates with microwave heating rather than convection heating and separate controlling parameters, will significantly shorten the reaction time (e.g. two hours reaction under ordinary condition can be achieved in 2 min. in microwave condition), guarantee precise temperature or power, etc. Those features open vast opportunities for reaction mechanism, kinetic and side reaction studies, therefore, ideal for the project tasks. The valuable experience from the work will be disseminated to the scientific community in form of presentations and publications.

These knowledges gained from the project will significantly improve scientific understanding on metal dissolution and recycling; will contribute in decision making on WEEE sustainable circular economy and will assist in education aspect for capacity building in the related area.