

Title: Recovery of some rare earth elements (REEs) from electronic wastes

Assoc. Prof. Tu Le Manh, Applied Electrochemical Lab, Faculty of Materials Science and Engineering, Phenikaa University, Vietnam. Email: tu.lemanh@phenikaa-uni.edu.vn

Abstract

Electronic waste (e-waste) contains valuable rare earth elements (REEs) like Neodymium (Nd), dysprosium (Dy), yttrium (Y), and europium (Eu), which are used in magnets, screens, and phosphors within electronic devices. Recovering these REEs from e-waste is crucial for reducing reliance on mining, stabilizing REE prices, and creating a sustainable circular economy. However, effective and environmentally friendly recovery methods are still under development, requiring research to optimize extraction processes and minimize environmental impacts. In this project, we propose a new extraction process based on the use of “greener” solutions such as deep eutectic solvents. Separation and extraction of REEs will be performed on a lab scale and then scale up to bench. Raw materials will be characterized using advanced techniques such as XRD, XRF. Leaching kinetics and recovery process of REEs will be studied using electrochemical means (especially, scanning electrochemical microscopy, SECM) and validated by ICP-EOS tests. The recovered REEs will be reused in form of catalyst material for wastewater treatment. Students will join us in the different research activities and possible publications of the results.

Objectives:

- To characterize physiochemical and crystallographic structures of e-waste using advanced techniques
- To study the leaching kinetics of REEs from e-waste using green solvents
- To electrochemically separate REEs from the leachate using green solvents