E-Waste Recycling Laboratory

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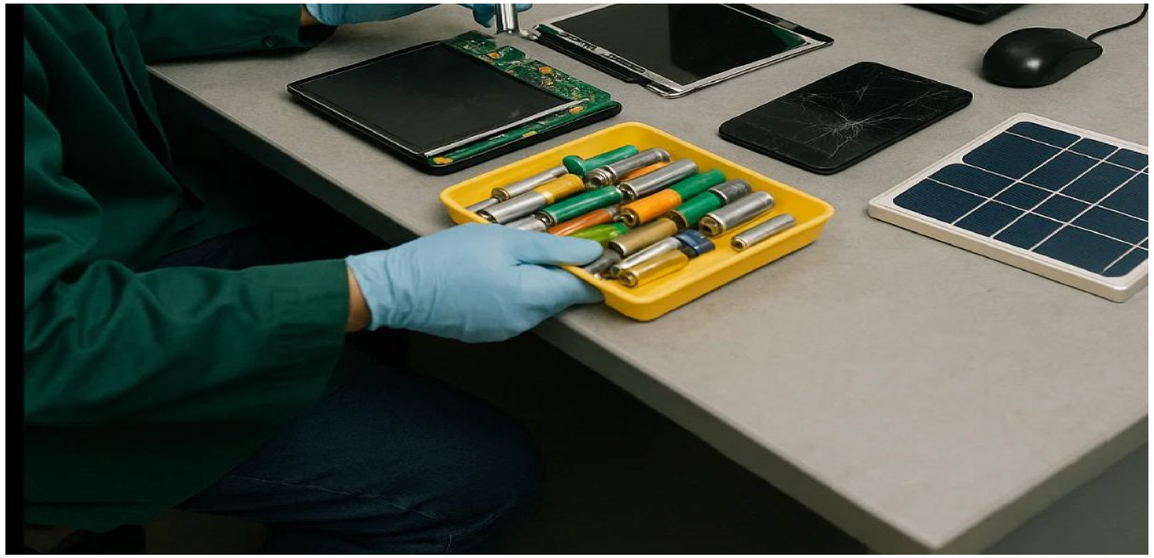
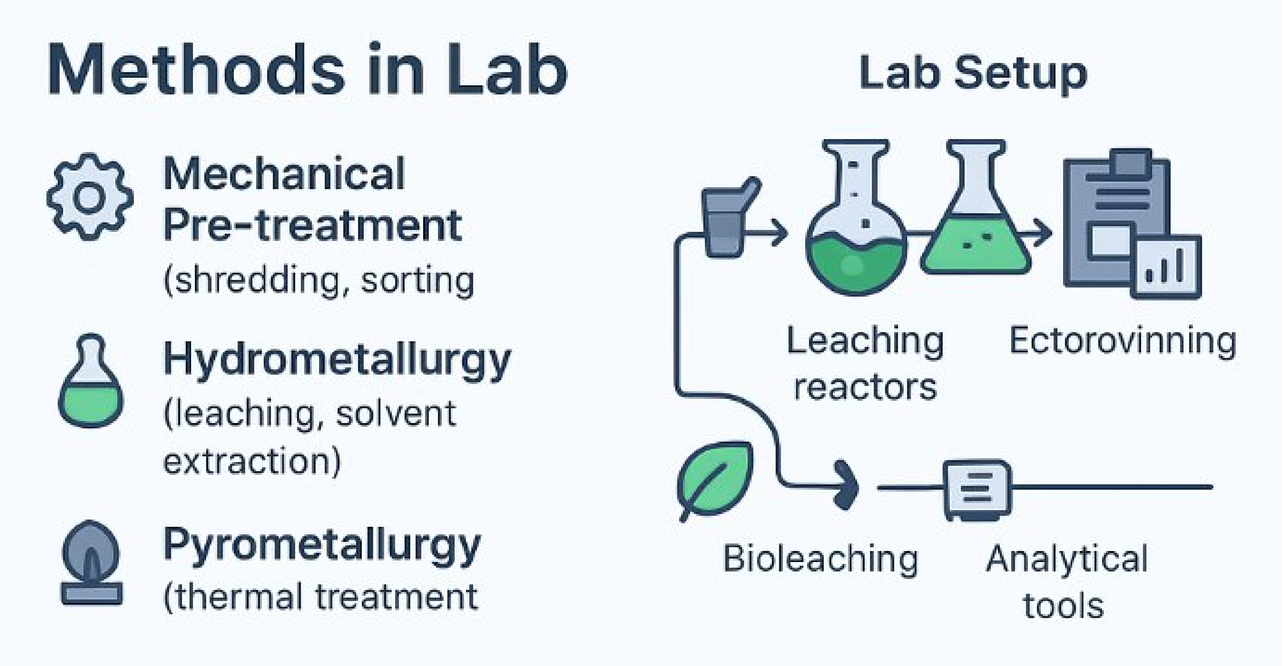
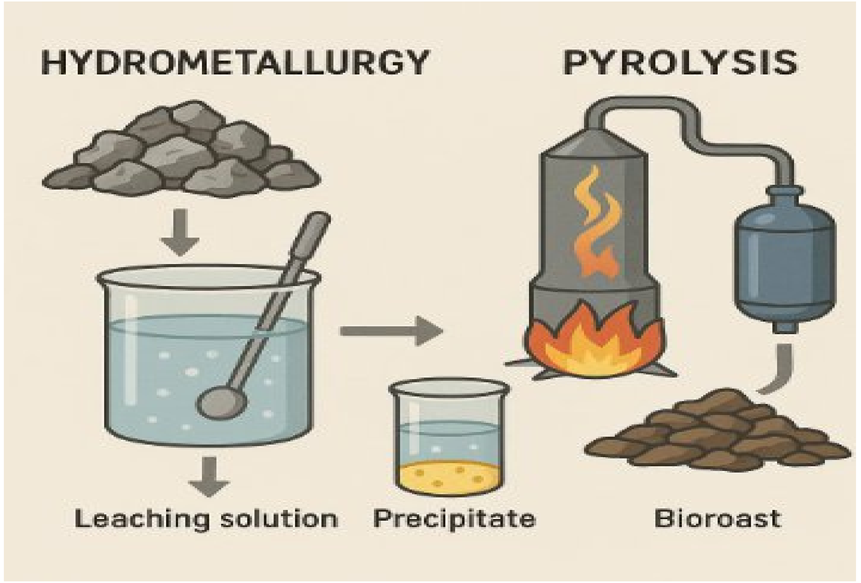
The rapid growth of electronic waste has emerged as a major global concern, with millions of tonnes generated each year. Among the discarded materials, rare earth metals (REMs) play a critical role due to their extensive use in renewable energy systems, electronics, and advanced technologies. However, current recycling practices remain inefficient, leading to poor recovery rates and increased dependency on mining. This highlights the urgent need for innovative methods to recover REMs from e-waste streams in a sustainable and cost-effective manner.



The Lab aims to develop lab-scale methods for the efficient recovery of rare earth metals (REMs) from various e-waste sources. By comparing and evaluating recovery efficiency across solar cells, lithium-ion batteries, and lead-acid batteries, the study seeks to identify the most effective and sustainable techniques. Ultimately, the work will contribute to promoting a circular economy whazardoushile reducing waste, thereby supporting cleaner technologies and resource conservation.

In the lab, rare earth metals can be recovered through several methods. **Mechanical pre-treatment** (shredding, sorting) prepares materials for further processing. **Hydrometallurgy** (leaching, solvent extraction) dissolves and selectively recovers metals, while **pyrometallurgy** uses high-temperature treatments for faster but energy-intensive recovery. **Bioleaching** offers a sustainable, low-energy alternative using microorganisms. Combined, these methods provide a comprehensive approach for efficient REM recovery.





Research on e-waste recycling at the laboratory scale can pave the way for industrial-scale recovery of rare earth metals (REMs), ensuring a more sustainable supply of these critical materials. Such advancements will directly support the growth of renewable energy, electronics, and other green technologies that depend heavily on REMs. Moreover, by promoting efficient recycling methods, this approach reduces dependence on conventional mining, conserves natural resources, and minimizes the environmental impacts associated with raw material extraction.