

Mining and Reprocessing Critical Materials in Industrial Waste Streams

Overview

Jake, Andy, and Karl from the Centre for Sustainable Material Processing at the University of Leicester presented their research on recovering critical elements from various waste streams, highlighting their industrial collaborations and the range of projects underway, including battery recycling, photovoltaic recovery, and adhesive development.

Key Insights

Industry Engagement & Use Cases: The team emphasized the need for real-life use cases and material samples from industry and MOD to validate their economic and value models for waste stream processing. They invited collaboration and outlined flexible approaches for handling sensitive or proprietary materials.

Design for Recycle Principles: Andy discussed published papers and practical design principles for easier end-of-life processing, such as using debondable adhesives and segregating materials by size or density. The importance of early segregation and product passports for efficient recycling was stressed.

Economic & Environmental Modelling: The Leicester team's software combines live metal prices, process costs, and life cycle analysis to assess the viability and environmental impact of recycling technologies. They noted that environmental performance depends on location, energy mix, and process byproducts.

Challenges & Strategic Considerations: MOD representatives raised concerns about the economics of recovery, operational resilience, and the need for broader strategic reasons beyond immediate financial returns. The group discussed the importance of UK material security, legislative incentives, and the risk of losing critical waste streams to competitors.

Digital Product Passports: There was consensus that digital product passports should focus on material composition and disassembly protocols, with flexibility for recyclers to adapt to changing technologies. The concept is being piloted in batteries and rare earths, with potential expansion to other products.

Collaboration & Next Steps: Plans were made for further engagement, including a spring event with industry, academia, and MOD to advance delivery and collaboration. The team encouraged sharing of contacts, resources, and case studies to identify low-hanging fruit for circularity and recovery.