SNACK SERIES

TEAM DEFENCE INFORMATION
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CRITICAL RAW MATERIALS

MINING AND REPROCESSING CRITICAL MATERIALS IN INDUSTRIAL WASTE STREAMS

UNIVERSITY OF LEICESTER | Centre for Sustainable Materials Processing

Principle Investigators

Professor Andrew Abbott

Professor Karl Ryder

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Advancing Critical Element Recovery: Key Highlights

The University of Leicester's Centre for Sustainable Material Processing—represented by Jake, Professor Andy Abbott, and Karl—shared updates on their rapidly growing research into recovering critical elements from waste streams. Their work spans battery and photovoltaic recycling, catalyst recovery, and the development of novel adhesives to support circular economy goals

Innovation in Recycling Technologies

The team showcased breakthrough processes using ultrasound-assisted chemistry to dramatically speed up material separation and metal recovery. These techniques enable rapid delamination of lithium-ion batteries, selective etching of printed circuit boards to recover gold, and preservation of high-value components from fuel cell membranes.

Economic and Environmental Assessment Tools

To support rapid decision-making, the group is developing software that integrates material composition data, live metal prices, and process modelling to evaluate the economic potential of different waste streams. Life cycle assessment is embedded in their analysis, considering energy use, carbon impact, and second-life applications such as reuse of EV batteries.

Design for Recycling and Product Passports

The team's published work recommends not mixing dissimilar metals and using separable adhesives to make recycling easier. Digital product passports were identified as a future necessity for tracking material composition and disassembly methods. Within the defence sector, participants noted a gap in recycling guidance and the opportunity to integrate these principles into future standards.

Collaboration, Stakeholder Engagement, and Policy

Stakeholders from the MOD, industry, and academia explored ways to strengthen cooperation, including providing real-world waste streams for analysis and using professional networks to expand engagement. Plans are underway for a spring event in London to drive progress on circular economy initiatives. Policy discussions touched on supply chain resilience, export risks,

Material Sourcing and Demonstration Projects

The group described their flexible approach to sourcing materials—from councils, aerospace companies, and manufacturers—and their ability to create synthetic samples when needed. Mapping waste flows and understanding logistics remain essential to identifying cost-effective intervention points and validating recycling technologies at scale.

Next Steps

Next steps include sharing the team's design-for-recycling publications with defence stakeholders, coordinating a full-day circular economy event in London, exploring collaboration opportunities with the Institute of Asset Management and related organisations, and developing clearer procedures for identifying and sourcing relevant waste materials.