Final University of Melbourne Stage 1 Test Results Validate High Rare Earth Recovery and Commercial Pathway

Highlights

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- **Final Stage 1 test results from the University of Melbourne (UoM) microwave-assisted rare earth element (REE) extraction project confirm successful ~25x scale-up while maintaining high recovery rates**
- **Testing achieved 96% Neodymium (Nd) recovery at 150°C, with stronger Praseodymium (Pr) recovery (>96%) subject to expected feedstock heterogeneity and analytical uncertainty**
- **Significant improvement in selectivity achieved at S/L 0.1 (solid to liquid ratio, 10%), with iron (Fe) leaching/removal reduced to as low as 3%**
- **Results support the commercial potential of the microwave-assisted process through lower temperature operation, improved separation efficiency and lower downstream purification burden**
- **Tested magnet feedstock contained 23.9% Nd and 7.6% Pr, highlighting the high-value rare earth content available from NdFeB magnet waste streams**
- **Livium and UoM are assessing grant funding pathways to support Stage 1 completion and Stage 2 prototype-scale activities**

Livium Ltd (ASX: LIT) ("Livium" or the "Company") is pleased to announce the final Stage 1 test results from its microwave-assisted rare earth element (REE) extraction project being conducted with the School of Chemistry at the University of Melbourne (UoM).

Stage 1 testwork activities were designed to assess the scalability and commercial viability of the microwave-assisted leaching process for recovering REEs from NdFeB permanent magnets. Final testing successfully scaled the process approximately 25x from initial laboratory conditions while maintaining high recovery rates and improving selectivity. The final report also confirms the operating window for further development.

Livium CEO and Managing Director, Simon Linge commented *"The final Stage 1 test results represent an important milestone in validating this technology. Achieving high rare earth recovery rates while significantly reducing iron dissolution and lowering operating temperatures demonstrates the pathway towards a commercially viable process.*

With this strong technical foundation in place, we look forward to progressing grant funding pathways and moving to the next stages of development, firstly prototype-scale testing and then commercialisation."

Positive Stage 1 test results

The key results demonstrated:

- **Enhanced process selectivity:** Nd recovery of 96% and higher Pr recovery >96% (subject to sample heterogeneity and analytical uncertainty).
- **Improved separation of REEs from iron:** Fe leaching reduced to as low as 3% with minimal impact on Nd and Pr recovery.
- **Further energy optimisation:** Operating temperatures reduced from 210°C to 150°C while maintaining strong recovery performance, as demonstrated above.
- **Optimisation of reagent usage:** Best-performing 150°C condition identified with mixed chloric and nitric acids.
- **Improved testing conditions:** Operation at higher solid-to-liquid ratios more representative of industrial conditions.

- **Future optimisation opportunities:** Results on single acid system showed poorer selectivity at 150°C, indicating that leaching system (acid and oxidant selection) remain key development variables.

Commercial Potential of NdPr Recovery

Nd and Pr are among the most commercially important magnet rare earths globally due to their use in high-performance NdFeB permanent magnets. NdFeB magnets underpin a range of critical technologies including electric vehicles, wind turbines, industrial motors, data centres, medical, aerospace and defence applications.

The UoM test work used spent NdFeB magnets sourced from discarded vehicle motors. The final test report records a feedstock composition of 23.9% Nd and 7.6% Pr, meaning the tested material contained approximately 31.5% Nd and Pr combined before recovery. This high contained value contrasts with the bulk material value of iron and supports Livium's view that selective rare earth recovery can be an important economic driver for future magnet recycling pathways.

While Fe represented 66.5% of the tested magnet feedstock, the final Stage 1 operating window reduced Fe leaching to 3%. This is commercially relevant because lower Fe dissolution has the potential to reduce downstream separation complexity, reagent demand and processing cost as development progresses.

Based on the final test report feedstock assay, one tonne of NdFeB magnet material contains approximately 315kg of Nd and Pr[1]. Applying the Stage 1 recovery performance and converting to oxide-equivalent product implies approximately 352kg of recoverable Nd/Pr oxide-equivalent per tonne of NdFeB feedstock[2]. At recent published NdPr oxide benchmark prices of approximately US$90–95/kg[3], this represents an indicative gross recoverable material value of approximately US$32,000-34,000 per tonne of NdFeB feedstock[4].

These values are indicative only and represent gross contained / recoverable material value before recovery losses beyond the tested leaching step, product conversion, separation and refining costs, payability, transport, feedstock preparation, reagent and processing costs, and commercial arrangements.

Commercial Feasibility and Stage 2 Pathway

The successful Stage 1 test outcomes provide an important technical foundation for Livium to assess future commercialisation pathways, including potential production of mixed or separated rare earth oxide products from end-of-life NdFeB magnet materials using microwave-assisted processing technology.

The final test report recommends further work focused on precise ions speciation control, microwave-solvent interaction studies, improved sample homogenisation and scale-up beyond 1 g to multi-gram or pilot-scale trials. These workstreams are expected to inform process control, energy efficiency, equipment design and downstream product specification for industrially relevant operation.

Following completion of Stage 1 testing, Livium and the University of Melbourne can commence planning of Stage 2 activities related to the Prototype Scale Microwave Reactor.

Livium and the University of Melbourne are assessing grant funding pathways to close Stage 1 Activities and support Stage 2 activities related to a Prototype Scale Microwave Reactor. The previously submitted Australia's Economic Accelerator (AEA) Ignite application is no longer available as a funding pathway following conclusion of that program, and alternative government funding opportunities are being assessed.

[1] UoM final test report feedstock assay: 1 tonne of NdFeB magnet material contains ~238.8kg Nd and 76.4kg Pr, or 315.2kg combined Nd + Pr.
[2] Stage 1 recovery result of 96.9% for Nd and capping Pr recovery at 100% gives ~307.8kg of recoverable Nd + Pr metal per tonne of NdFeB feedstock. Converting this to oxide-equivalent product gives ~362kg of recoverable Nd/Pr oxide-equivalent per tonne of NdFeB feedstock.
[3] Source: SMM Pr-Nd oxide price 1 June 2026 (https://critical-minerals-news.com/rare-earths-price/)
[4] Applying NdPr oxide benchmark price of ~US$90–95/kg implies gross recoverable material value of ~US$33,000–34,000/ tonne of NdFeB feedstock. This is gross material value only and does not account for downstream recovery losses, separation and refining costs, payability, product quality, transport, feedstock preparation, reagent and processing costs, or commercial terms.

Authorised for release by the Managing Director and CEO.

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About Livium

Livium Ltd (ASX: LIT) is Australia's leading battery recycler through its wholly owned subsidiary Envirostream — a profitable business focused on the recovery of valuable materials from end-of-life batteries.

Building on this foundation, Livium is expanding into adjacent opportunities including recycling of rare earth elements and solar panels, and the processing of black mass — strengthening Australia's clean-energy supply chain.

Forward-looking statements

This announcement contains forward-looking statements. Forward-looking statements are subject to a variety of risks and uncertainties that it is beyond the Company's ability to control or predict and which could cause actual events or results to differ materially from those anticipated in such forward-looking statements. Investors should be aware that past performance should not be relied upon as being indicative of future performance.