

07 March 2022

## SEREN TECHNOLOGIES ACQUISITION UPDATE

Ionic Rare Earths Limited (**IonicRE** or the **Company**) (ASX: IXR) is pleased to provide an update on the acquisition of 100% of Seren Technologies Limited (**SerenTech**), a UK private company with unique and leading-edge rare earth separation technology, as announced on 8 December 2021.

SerenTech is commercialising technology using ionic liquids for separation and refining of rare earth elements (REE), which includes the full cohort of the proposed basket from Makuutu, consisting of the lanthanides series, Lanthanum (La), to Lutetium (Lu), plus Scandium (Sc) and Yttrium (Y).

SerenTech has an exclusive “patent and know-how” licence from Queens University Belfast (QUB) allowing it to develop and commercialise the technology. Additionally, SerenTech has also developed know-how in this area and lodged a further four (4) global patents, providing a pipeline of opportunities in which to deploy the technology.

The application of SerenTech patented technology has achieved separated and refined products to high purity with REO grades above 99.9% demonstrated at pilot scale in two key applications;

- Mining ore concentrate: the pilot scale plant has processed concentrate received from supply chain stake holders and achieved separation of REEs; and
- Permanent magnet (Neodymium-Iron-Boron, NdFeB) recycling: the pilot scale plant has processed spent permanent magnets received from supply chain stake holders and achieved extraction of recycled rare earth oxides at purity 99.9% plus.

This technology has the potential to be applied to other critical raw materials.

IonicRE is finalising the due diligence which has included a commercial, finance, legal, intellectual property, and technical review. IonicRE Managing Director, Tim Harrison, recently completed a visit to SerenTech at QUB, and affiliate Queens University Ionic Liquids Laboratory (QUILL), to discuss recent technical advances with the team and discuss strategies for commercialisation over the next 18 months.

Given the nature of the extensive review, the exclusivity period has been extended until 31 March 2022 to enable all remaining items to be finalised including the Share Purchase Agreement (SPA). A submission has been made to the UK National Security and Investment Act 2021, which came into effect on 4 January 2022, for approval from the UK regulators given SerenTech constitutes a “qualifying entity” for the purposes of SI 2021 No. 1264, more specifically SerenTech conducts activities which fall within the defined sector of Advanced Materials.

The Company does not foresee any regulatory issues in finalising the transaction.

IonicRE Managing Director Tim Harrison commented:

*“The due diligence process has to date identified no issues for IonicRE and vendors to finalise the transaction, and planning is progressing well for the integration of SerenTech and the team into IonicRE. Together we have been mapping out a strategy to accelerate the development of the technology, specifically in magnet recycling applications across the EU, UK, and USA, plus supporting the efforts of IonicRE in optimising the flowsheet design for a rare earth refinery to unlock the basket potential of the Makuutu Rare Earths Project. We look forward to completing the transaction at the earliest opportunity.”*

## **Acquisition Rationale**

The acquisition of SerenTech delivers IonicRE an immediate rare earth separation and refining capability to target high purity products. Most attractive is the demonstrated capability to recycle NdFeB magnets via extraction of the individual REE content to produce high purity REO products, which we expect will provide a step change to magnet recycling appeal globally.

SerenTech has demonstrated capability to separate magnet rare earths Neodymium (Nd), Praseodymium (Pr), Dysprosium (Dy) and Terbium (Tb) for modest capital requirements. This presents an opportunity for targeted deployment in key markets in the US, Europe, and Asia where existing inventories of magnets exist and where the current recycling technology fails to be able to achieve similar REE extraction results, thus providing a step change advantage and the ability to take an early mover position in new NdPr supply.

Opportunities have been identified for near term demonstration and deployment of the technology to help bridge the shortfall in magnet REE’s (Nd, Pr, Dy and Tb) supplied to western markets where demand is expected to grow by up to 20% compounded annually. Shanghai Metals Market (SMM) recently forecast the recycling of NdFeB scrap is likely to be the largest growth of NdPr supply from 2021 to 2025<sup>1</sup>.

## **About Seren Technologies Limited**

Seren Technologies Limited is a subsidiary of Seren AG, a private equity company based in Switzerland, with a focus on early-stage development of new technologies, which provides or facilitates financing and seeks to add value through investment analysis, corporate structuring, and business development.

Since its founding in 2015, SerenTech has developed processes for the separation and recovery of REEs from mining ore concentrates and waste permanent magnets with the potential to provide a step change in efficient, non-hazardous, and economically viable processing with minimal environmental footprint compared to current practices. SerenTech has developed a toolkit of separation techniques and solvent systems incorporating both conventional organophosphorus extractants and ionic liquids (ILs) that can be combined to and applied to different mixed rare earth feeds.

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<sup>1</sup> <https://news.metal.com/newscontent/101669714/Scrap-Recycling-Likely-to-be-the-New-Growth-Engine-of-PrNd-Market-in-2021-2025/>

SerenTech's process uses an alternative and more environmentally benign extractant, an optimised ligand, for rare earth metal extraction, separation, and processing.

The technology developed by SerenTech has several advantages compared to existing or alternative options with respect to the industrial processing of rare earths:

- The ionic liquid is fully recyclable to the extent the ligand can be considered a capital rather than operational cost.
- Greatly reduced acid consumption, with optimum pH levels between 2 and 4 throughout the whole process.
- High separation factors for individual REE separation and refining capability.
- There are no toxic waste products, and
- Potential to tune the ligands to focus on pairings or groupings of rare earths, giving greater flexibility in approaching the separation of rare earths from mining feed sources.

Impressively, work to date has demonstrated capability for REEs to achieve near complete extraction from lower quality spent magnets and waste (swarf) to near complete recovery to high value rare earth oxide (REO) product quality exceeding 99.9% REO.

This presents a potential opportunity to provide a first mover advantage post acquisition to IonicRE in the industrial elemental extraction of REEs from spent magnets and waste, enabling near term magnet REO production capability to satisfy growing demand and lagging new supply chains.

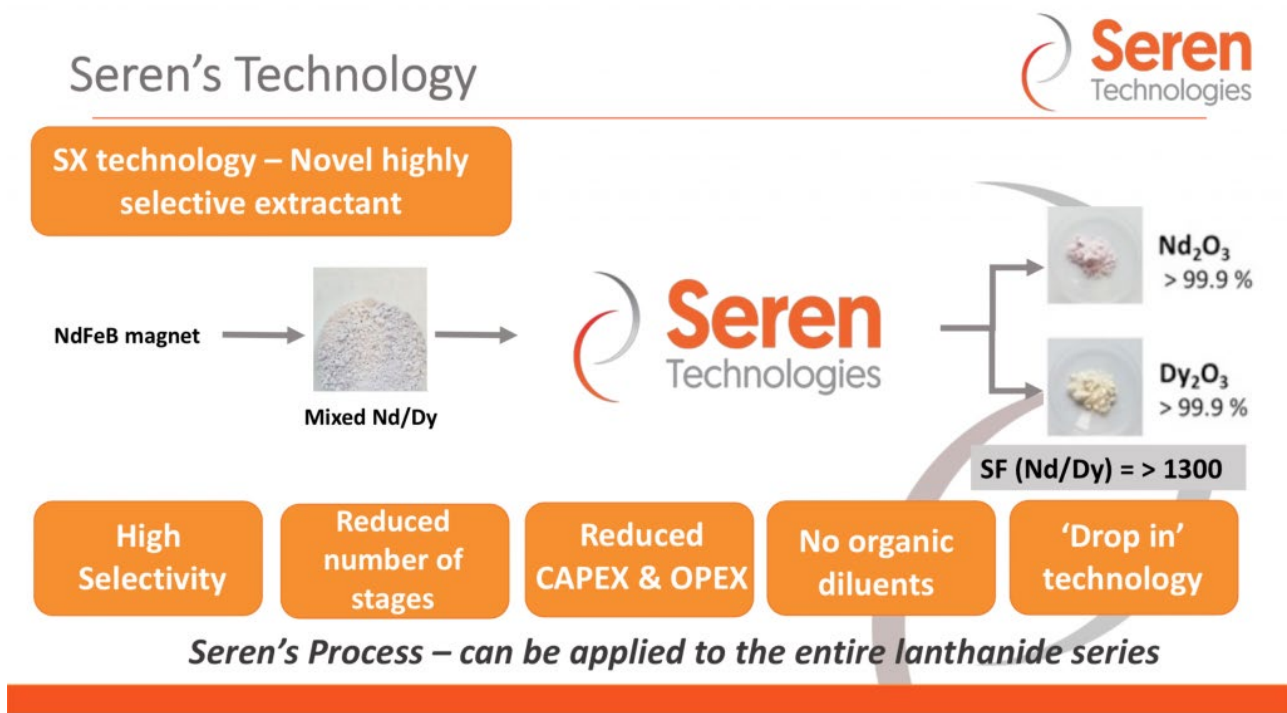
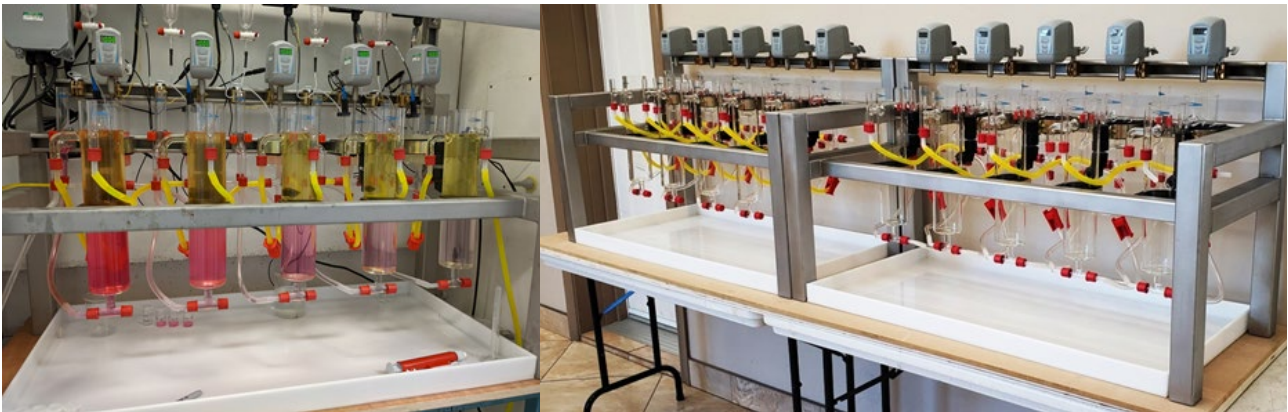


Figure 1: Magnet recycling potential of ionic liquids technology developed by SerenTech.

The technology developed by SerenTech provides considerable benefits over alternative magnet recycling technology presently being marketed and operated, including hydrogen decrepitation, which simply breaks down spent magnets and swarf to be recast as magnets of the similar or lesser quality. The advantage of the technology developed by SerenTech is to provide potential for

magnets REEs to be extracted from lower quality and variable grade magnets, to then be recycled into newer higher content REE containing permanent magnets, used in higher value applications.



**Figure 2: Mixer Settler pilot plant located at Queens University Ionic Liquids Laboratory (QUILL) at QUB.**

Authorised for release by the Board.

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