PROJECT TITLE: Flowsheet development for an alternate leach system for Mt Weld rare earth ore types

FIELD OF RESEARCH CODE: 0914

PROJECT SYNOPSIS:

Lynas Corporation (Lynas) generated a lot of excitement in the Goldfields last year when they announced plans to pair their world class rare earth elements (REE) mine and reserves at Mt Weld with an investment of up to $500M in a new processing plant in Kalgoorlie, a major step towards establishing a critical minerals hub in the Goldfields. That excitement is further heightened by an accelerated timeframe, with plans for the new plant to be operational in 2023. Of course, no process of such complexity is without its challenges, and Curtin University – WA School of Mines (Curtin/WASM) is actively partnering with Lynas in several areas of research. This partnership provides significant opportunities for student-driven projects that
support both local community development goals and broader national strategy around critical minerals. Current priorities revolve around maximizing process economics to reflect Australian operating conditions and adapting processing methods to future changes in ore type. Relevant work in progress or recently completed includes improving oxalate recycle in leach circuits and effects of common ion contaminants of ground water on phosphate mineral flotation.

The project immediately available to the right PhD candidate will be the investigation and proving of a low-cost, alternate direct leach process for phosphate REE ores and process intermediary material. The use of oxalic acid leach was suggested as a possible new method for rare earth extraction by (Lazo, et al., 2017) (Lazo, et al., 2018). Challenges with this process in phosphate ore have been shown in tests to include excessive consumption of oxalic acid by iron and inability to exclude iron, however, measured phosphate extraction greater than 40%, and thus indicated REE extraction greater than 60% of primary product elements demands further investigation. It has also been indicated that oxalate leaching of Mt Weld ore could present the opportunity to capture manganese, a mineral of high criticality and moderate resource potential in Australia (Geoscience Australia, 2013).

The current state of the technology revolves around 3 primary processes that show great potential in direct extraction of rare earths and generation of an REE compound from monazite feed stocks. The candidate will contribute to the development of a full extraction flowsheet through investigation of one or more aspects of the proposed process. One of the key areas is solution treatment for reagent recycling and secondary product generation. Oxalic acid consumption is relatively high, although it is not overly expensive, a cheap and simple regeneration scheme would aid in the robustness of the treatment. There are other valuable components of the stage 1 leach solution (manganese, phosphate, etc.), the recovery of which represents significant value. There is also significant scope for optimisation of the primary stages to maximise recovery, throughput, reagent efficiency, etc.

The results of this project would make for a strong thesis and case for publication. Additionally, it will provide a thorough report to Lynas on the potential recoveries and costs of this alternative method of REE leaching allowing them to make a confident business decision. This work will directly support Australia’s Critical Minerals Strategy, Curtin/WASM strategic goals, and the City of Kalgoorlie-Boulder Economic Development Plan. This is a significant opportunity for the PhD candidate to work with well-regarded academic researchers at a globally respected University and make lasting connections with the Australian mining industry.

**FEASIBILITY AND RESSOURCING – DESCRIPTION OF THE SUPPORT THIS PROJECT WILL RECEIVE:**

Being a small and nimble team in the WASM Metallurgy Department, the only immediate need to advance this project is a capable and enthusiastic set of hands. There is ongoing support for the thesis supervisory team through Curtin, as well as, indicated external support for project specific work from CRC Ore and Lynas. The WASM campus is home to modern mineral processing, hydrometallurgy, and computer labs with sufficient capacity and dedicated support staff. All other campus resources, including access to supervisors, library and student support, residential college, and an accessible, vibrant community are all in place to ensure student success. The thesis team and Lynas technical staff are in regular communication for updates and strategy.
THE SIGNIFICANCE OF THE PROJECT/ PROGRAM FOR THE ENROLLING SCHOOL OR INSTITUTION:

Supporting Australia’s Critical Minerals Strategy is a focus area for Curtin/WASM, and Lynas is an important industry partner. Success in this initiative will benefit the region for many years, supporting a long mine life, and associated mineral processing activities. Implementation of this work with Lynas will elevate the Curtin/WASM brand across Australia and achieve strategic WASM objectives to improve industry outcomes through relevant research. This will further attract research talent and industry support for ongoing work in the critical minerals space.

Students must express interest in this scholarship opportunity by emailing the Project Lead listed below. Please provide a copy of your current curriculum vitae and detail your suitability to be involved in this strategic project.

PROJECT LEAD CONTACT:

Name: Laurence Dyer
School: WASM: Minerals, Energy and Chemical Engineering
Faculty: Science and Engineering
Email: Laurence.Dyer@curtin.edu.au
Contact Number: 08 9088 6122