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Lithium Australia granted Australian patent for lithium extraction technology

HIGHLIGHTS

- **SiLeach® patent application granted by IP Australia.**
- **SiLeach®, which provides for low-energy recovery of lithium from micas, is potentially a short-cut in the production of lithium-ion batteries.**

Comment from Lithium Australia managing director Adrian Griffin

"Lithium Australia's revolutionary SiLeach® process unlocks the value in lithium-bearing clays and micas.

"The SiLeach® process can produce a range of lithium chemicals, including lithium carbonate and lithium phosphate. Significantly, the use of lithium phosphate (Li_3PO_4) is the shortest route to the production of lithium ferro phosphate ('LFP') batteries, which is also advantageous from an environmental, social and governance perspective.

"Granting of the Australian SiLeach® patent is timely, given increased interest in the extraction of lithium from clays in North America, and even more so now that Chinese LFP production in the March 2021 quarter alone almost eclipsed the entire 2020 production. The lithium and phosphorus required to manufacture LFP are both produced by SiLeach® as a single lithium chemical. It has been shown that the lithium phosphate product from SiLeach®can be directly used in the manufacture of LFP cathode powder We invite anyone with a lithium mica or clay deposit to reach out and see what we can offer; also, those cathode producers interested in discussing a more direct route to LFP synthesis using our proprietary VSPC cathode powder production technology."

SiLeach® pilot plant operations at ANSTO.

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Introduction

Lithium Australia NL (ASX: LIT, 'the Company'), together with the Australian Nuclear Science and Technology Organisation ('ANSTO'), is continuing R&D on its revolutionary lithium-recovery technologies for the production of critical battery chemicals. These technologies aim to deliver efficient, sustainable processing and production options for the lithium-ion battery ('LIB') industry while reducing that industry's environmental footprint for the benefit of the planet as a whole.

Australian patent granted

The Company has received a 'Certificate of Grant' from IP Australia for a standard patent dated 6 May 2021. SiLeach® (first-generation) now has 20 years of legal protection in Australia from 9 February 2017.

A world leader in technical expertise

The Company's lithium chemical division has partnered with the best technical expertise available, including at ANSTO, to develop lithium extraction technologies, with a focus on low-grade and waste materials. Those materials include the following:

- lithium micas;
- fine spodumene, and
- spent LIBs.

Lithium Australia has lodged patent applications for most of the technology emanating from its R&D programs. Those technologies include the following.

- SiLeach® for the recovery of lithium and other valuable by-products from mica.
- LieNA® for the recovery of lithium from spodumene concentrates, with an emphasis on fine and/or low-grade spodumene.
- Recovery of lithium as a lithium phosphate from brine or pregnant process liquor.
- Refining of lithium phosphate to achieve an ultra-pure (>99.9%) chemical.

The production of lithium phosphate is a common thread in the Company's proprietary extraction technologies. It is a key ingredient in the production of LFP cathode powder, which will power Tesla 3 electric vehicles ('EVs') not only in China but elsewhere around the globe. LFP is a much safer alternative compared to more conventional LIB chemistries and can be produced more cheaply as well.

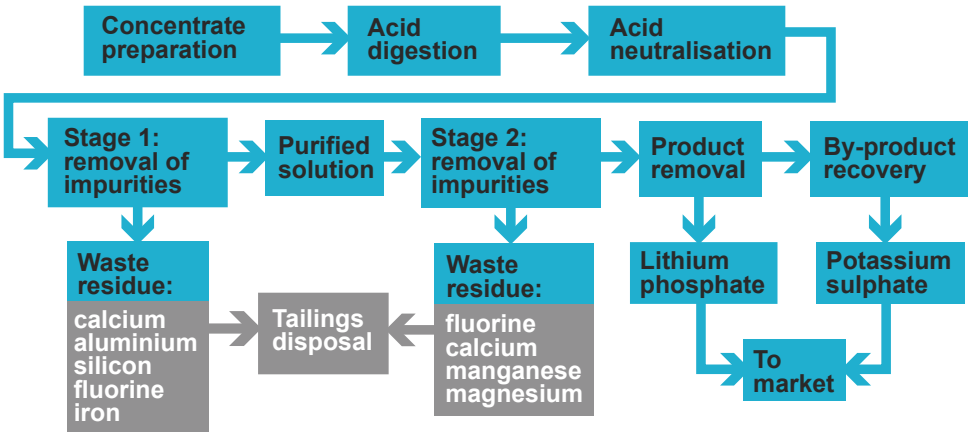
EV makers in China are reportedly very confident that demand for LFP will continue to grow. Indeed, their support of this market is such that BYD, a leading Chinese producer of LIBs, has greatly increased its LFP production to meet anticipated demand. Others will follow.

SiLeach® – the preferred process for recovery of lithium from micas

SiLeach® is a fluorine-assisted, acid-leach recovery process designed specifically for lithium mica minerals. It should be noted that although fluorite (naturally occurring

calcium fluoride) is added to enhance the process, the micas themselves, during decomposition, release significant quantities of fluorine, since they may initially contain up to 8% or more fluorine as part of their makeup. Unlike other processes, the SiLeach® flowsheet design contains specific fluorine removal and control steps, in order to optimise the handling of fluorine generated during the decomposition of the mica minerals. Superior water balance is also a key attribute of the flowsheet, which is capable of recovering lithium from the dilute process liquors generated during the SiLeach® process. This approach eliminates much of the requirement for evaporation, which is a high capital and operating cost of competing systems.

SiLeach® flow chart



Proof of process via successful pilot testing

Two generations of SiLeach® pilot plants have been operated successfully at the ANSTO facility at Lucas Heights in New South Wales. Safety was of paramount importance during the operation of each of the pilot plants; in particular, the deportment of fluorine. Controlled operating conditions ensure that no hydrofluoric acid is produced during plant operation, while fluorine is removed from the circuit as benign fluoride minerals. This ensures the environmental integrity of the SiLeach® process.

Reduced processing steps

SiLeach® offers significant advantages over competing processes, particularly with respect to the recovery of lithium from low-tenor solutions, which minimises the capital cost of evaporators and the high energy costs associated with evaporation. Direct precipitation of lithium as a phosphate, and its subsequent refining, provides the potential for direct feed into the production of LFP cathode powders.

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The Company, through its 100%-owned subsidiary VSPC Ltd, has produced LFP cathode powder from tri-lithium phosphate generated via the SiLeach® process. The LFP was subsequently used to manufacture battery cells for testing, with positive results.

Supply of tri-lithium phosphate to LFP producers eliminates the requirement for lithium hydroxide or lithium carbonate in some of the LFP production processes, thereby shortening the supply chain.

SiLeach® first-generation patent jurisdictions

The Company's IP, a valuable asset derived from its R&D activities, is managed by way of formal patent processes and retaining its 'know-how' as trade secrets.

Patent application PCT/AU2017/050104 details the first-generation SiLeach® technology. This application has been lodged in the following jurisdictions.

- Australia – patent granted (Patent number 2017218457).
- USA – patent granted (Patent number 10,883,157,B2).
- Chile – ongoing examination.
- Europe – claims allowed and intention to grant issued.
- Brazil – request for examination filed.
- Canada – under accelerated examination.

SiLeach® second-generation patent application for process improvements

Patent application PCT/AU2019/050541 details the second-generation SiLeach® patent application, which has been published under the Patent Cooperation Treaty by the World Intellectual Property Organisation, with a priority date of 30 May 2018. The Company has received a written opinion from the International Searching Authority on the patentability of the application, confirming that the claims are novel and inventive. This application has been lodged in the following jurisdictions.

- Australia – national phase entry has commenced and awaiting examination.
- USA – under examination.
- Chile – accepted into examination.
- Europe – under examination.
- Brazil – national phase entry has commenced and awaiting examination .
- Canada – national phase entry has commenced and awaiting examination.

Expansion of the LFP market

LFP provides significant advantages over the nickel- and cobalt-based battery chemistries with which it competes. Those advantages include the following.

- Tri-lithium phosphate is the ideal precursor.
- Less costly to produce.
- No conflict metals required.

- Stable supply chain.
- Wide operating temperature range.
- Thermal stability (no runaway).
- Greater longevity.
- High charge and discharge rates.
- Reduced battery management requirement.

As noted previously, major Chinese LIB producer BYD has significantly increased its LFP production capacity; also, the Tesla Model 3 made in China using LFP batteries is now being introduced into ten European jurisdictions – and, like Tesla, BYD is introducing its LFP-propelled Han sedan to European customers.

Producers of energy-storage products, too, are capitalising on LFP's superior safety and longevity. Meanwhile, shifts in legislation in North America, Europe and China will mean that fire protection for EVs with nickel-based battery packs will be mandatory, which is likely to increase pressure for a shift to LFP, the 'safe' LIB.

Authorised for release by the Board.

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About Lithium Australia NL

Lithium Australia aims to ensure an ethical and sustainable supply of energy metals to the battery industry (enhancing energy security in the process) by creating a circular battery economy. The recycling of old lithium-ion batteries to new is intrinsic to this plan. While rationalising its portfolio of lithium projects/alliances, the Company continues with R&D on its proprietary extraction processes for the conversion of *all* lithium silicates (including mine waste), and of unused fines from spodumene processing, to lithium chemicals. From those chemicals, Lithium Australia plans to produce advanced components for the battery industry globally, and for stationary energy storage systems within Australia. By uniting resources and innovation, the Company seeks to vertically integrate lithium extraction, processing and recycling.