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Lithium Australia's US patent application for lithium extraction technology approved

HIGHLIGHTS

- **SiLeach® patent approved by US Patent and Trademark Office.**
- **SiLeach® provides for low-energy recovery of lithium from micas and clays.**
- **The process is potentially a short-cut in the production of lithium-ion batteries.**

Lithium Australia NL (ASX: LIT) ('Lithium Australia' or '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.

Recent receipt of a 'Notice of Allowance' from the United States Patent and Trademark Office for Lithium Australia's SiLeach® patent application US 16/076,643 (filed August 2018) is vindication of the value of the Company's intellectual property ('IP').

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 waste materials. Those waste materials can be classified as:

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

Lithium Australia has lodged patent applications for most of the technology emanating from its R&D programmes. 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 the fine and/or low-grade spodumene.
- Recovery of lithium as a tri-lithium phosphate.
- Refining of tri-lithium phosphate to achieve an ultra-pure (>99.9% Li_3PO_4) substance.

The production of tri-lithium phosphate is a common thread in the Company's proprietary extraction technologies. This lithium chemical is a key ingredient in the production of lithium ferro phosphate ('LFP'), the material that will power Tesla 3 electric vehicles ('EVs') not only in China but elsewhere around the globe. LFP provides a much safer alternative to more conventional LIB chemistries and does so at a much-reduced production cost.

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 leading Chinese LFP LIB producer

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BYD plans to upgrade its LFP production capacity eight-fold this year, with others to follow.

SiLeach® – the preferred process for recovering 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.

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. Furthermore fluorine is removed from the circuit as benign fluoride minerals providing environmental integrity to the SiLeach® process.

Patent application

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

Patent application PCT/AU2019/050541 details the second-generation SiLeach® patent application, which continues to be assessed in multiple jurisdictions, including the US.

Patent application PCT/AU2019/050540 details Lithium Australia's process for recovering lithium phosphate from lithium-bearing solutions such as brine or pregnant process liquor. The application (and patent, if granted) protects the Company's phosphate process route for the production of lithium chemicals suitable for use in LFP cathode powders.

Recently too, Lithium Australia announced receipt of a Certificate of Grant from IP Australia for its revolutionary first-generation LieNA® technology patent application. Acceptance of this patent application within other international judications is also being sought. The Company's patent application for its second-generation LieNA® technology within the same jurisdictions also continues to progress.

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The expanding LFP market

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

- Lithium phosphate is the ideal precursor.
- Low cost.
- No conflict metals.
- 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 LFP LIB producer BYD is increasing capacity eight-fold this year, and the Tesla Model 3 produced in China uses LFP batteries, with that variant now introduced into ten European jurisdictions.

Energy-storage producers are also capitalising on LFP's superior safety and longevity. Meanwhile, shifts in legislation in North America, Europe and China will mean that EVs with nickel-based battery packs require fire protection – this is likely to increase pressure for a shift to LFP, the 'safe' LIB.

Significantly reduced processing steps

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

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

Supply of lithium phosphate to LFP producers shortens the supply chain by eliminating the requirement for lithium hydroxide or lithium carbonate in some of the LFP production processes.

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Comment from Lithium Australia MD Adrian Griffin

"Granting of the US SiLeach® patent at a time of increased interest in the extraction of lithium from clays in north America is very timely … even more so as LFP is the most rapidly expanding sector of the LIB industry. Both the lithium and phosphorus required to manufacture LFP are produced by SiLeach® as a single lithium chemical. Anyone with a lithium mica or clay deposit is welcome to get in touch and see what we can offer, as are cathode producers interested in discussing a more direct route to LFP synthesis using VSPC cathode powder production technology."

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.

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