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Lithium Australia

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Lithium Australia advances commercialisation of high density battery cathode material

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HIGHLIGHTS

- **Lithium Australia subsidiary VSPC continues to improve lithium manganese ferro phosphate ('LMFP') cathode powder for use in lithium-ion batteries ('LIBs')**
- **VSPC's patented RC Process can be used for manufacturing both lithium ferro phosphate ('LFP') and LMFP without significant changes in the process**
- **LMFP cathode powder increases the energy density of battery packs, increasing the range of electric vehicles**
- **Tier 1 battery manufacturers have been qualifying LMFP cells for use in electric vehicle ('EV') battery packs in North America**
- **Multiple requests for LMFP samples have been received by VSPC, including four since February 2022**
- **VSPC is one of only a few companies outside of China with the technical expertise to manufacture LFP and LMFP, therefore reducing supply chain risk**

Lithium Australia Limited (ASX:LIT) (**Lithium Australia** or the **Company**) is pleased to provide an update regarding its wholly owned subsidiary, VSPC Pty Ltd ('**VSPC**'). VSPC develops leading-edge materials for e-mobility and energy storage applications and, ultimately, a zero-carbon economy at its pilot plant and research facility located in Brisbane, Australia. VSPC is commercialising its patented RC Process which has the potential to manufacture LFP and LMFP cathode powders at scale.

LFP LIBs are cheaper, safer, and longer lasting than their nickel cobalt battery counterparts. Indeed, it is the superior performance criteria of LFP, combined with an anticipated shortfall in nickel and cobalt supply, that has led to the market to move further toward LFP. LMFP is widely regarded as the next generation lithium metal phosphate material, as it has the potential to retain all the advantages of LFP, whilst matching the energy density of nickel cobalt chemistries at the battery pack level.

The ability for VSPC to pivot between LFP and LMFP is a strategic advantage, demonstrated by the increased request for LMFP samples by the lithium-ion battery industry. In response to these enquiries for samples, VSPC has delivered certain enhancements to its LMFP product and is in the process of generating LMFP to satisfy the most recent enquiries.

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Comment from Lithium Australia's GM – Batteries, Andrew Skalski

"To achieve global emission targets, fossil fuels will need to be replaced with renewable energy sources, and this is facilitated by high efficiency batteries. VSPC's LFP and LMFP cathode powders are an integral component of these high efficiency batteries and interest in our product is pleasing as VSPC moves towards commercialisation."

Lithium Manganese Ferro Phosphate ('LMFP') Batteries

The theoretical energy density of LMFP batteries can reach up to 230 Wh/kg, 15 to 20 percent higher than LFP batteries, with almost no difference in the cost of the material inputs. Adding manganese to the LFP chemistry formula, increases the voltage from 3.2 to 4 volts, thus boosting the battery's energy density.

Contemporary Amperex Technology Co. Limited ('**CATL**') announced in July 2022 its intention to launch its LMFP batteries next year that have a maximum energy density of 230 Wh/kg, slightly less than ternary batteries at 250 Wh/kg, yet with manufacturing costs close to that of LFP batteries. With this increased efficiency and performance, CATL claims EVs with a range greater than 700 km can be achieved. (source: BusinessKorea website, July 2022).

VSPC Product Development

VSPC has continued to optimise its LMFP formulation with an equal manganese ('Mn') to iron ('Fe') ratio, as this performs well over a range of charge rates, including reasonably high rates.

Recent advances include:

- Improved sphericity of LMFP agglomerates as shown in Figure 1, which favours manufacture of higher density electrodes.

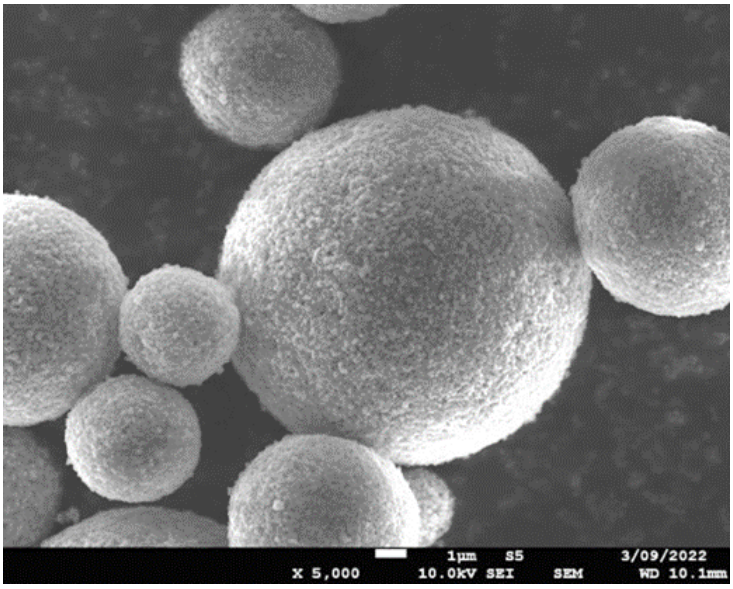

Figure 1. SEM image of the current LMFP product

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- An increase in the voltage and stability of the high voltage plateau with the same Mn content, resulting in higher energy density compared to earlier samples (Figure 2).
- The voltage profile and energy density have recorded improved stability with repeated cycling and after high-rate cycling (Figure 2).

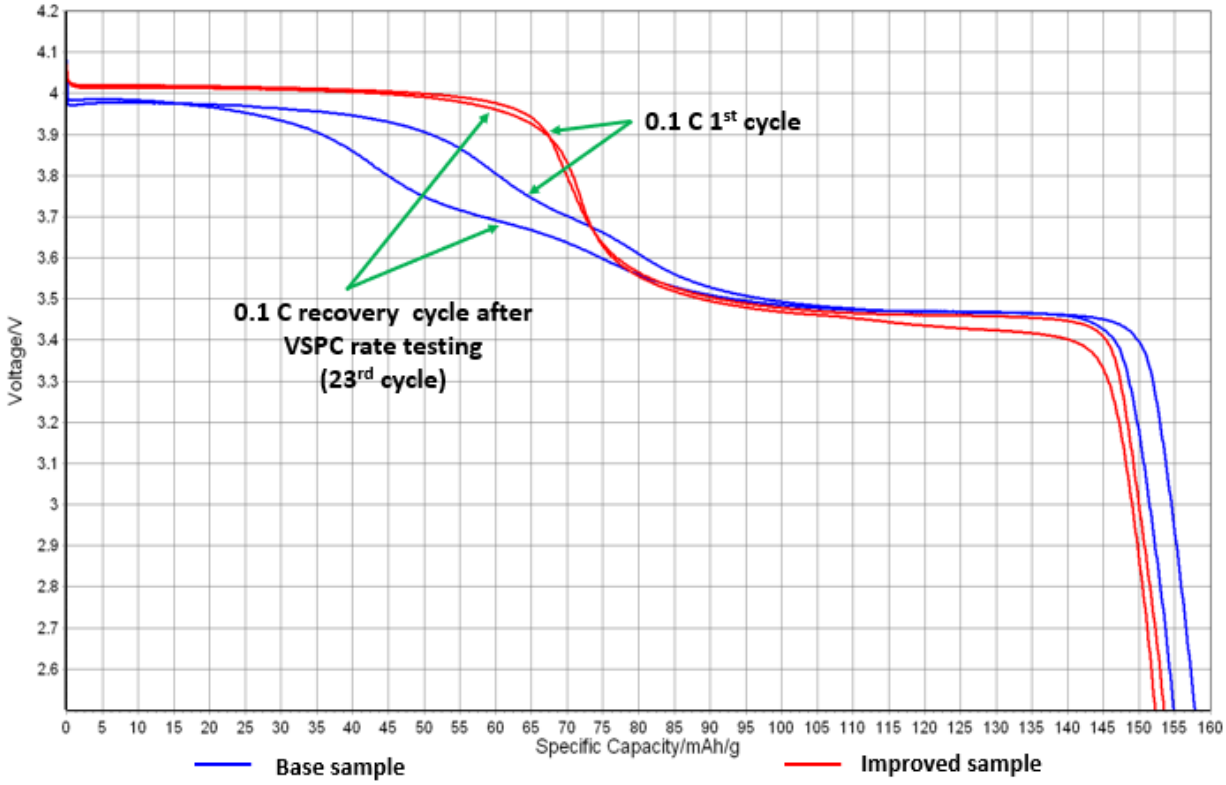

Figure 2. Graph of voltage and specific capacity for the base LMFP sample (blue) and the improved LMFP sample (red).

- Energy density improvement (590 Wh/kg) over VSPC's high quality power LFP at 0.1 C (550 Wh/kg) for a 50:50 Mn:Fe ratio, with scope to increase this further with higher Mn content formulations. This translates to 236 Wh/kg at cell level which is comparable to that of CATL LMFP cells (Figure 3).

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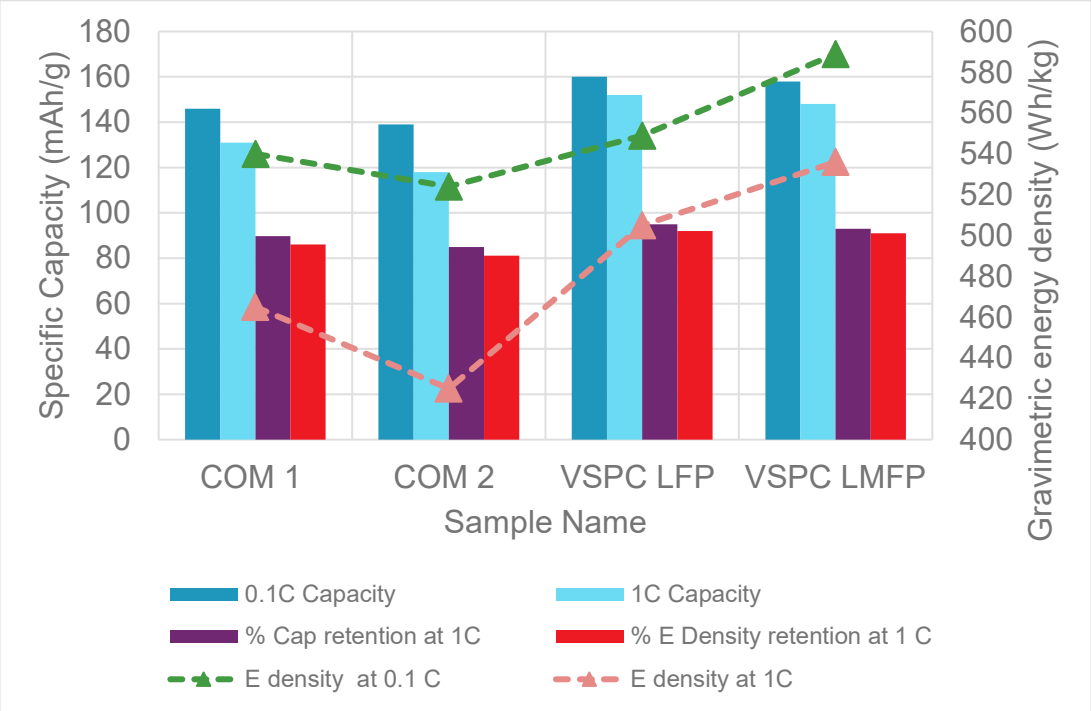

Figure 3. Graph of specific capacity and gravimetric energy density of two commercial LMFP samples compared to VSPC's LFP and LMFP

- The specific capacity and energy density at 1 C is > 90% of the 0.1 C value.
- A low cost, readily available Mn source has been shown to work at least as well as the previously used high-cost Mn source.
- Benchmarking of the improved VSPC product against two commercial LMFP samples showed that the VSPC LMFP is superior both in terms of specific capacity and energy density.

Advantage of the VSPC RC Process

The RC Process offers several distinct advantages over other synthesis processes which includes the following:

- The RC Process can be used for manufacturing both LFP and LMFP without significant changes in the process.
- VSPC test work has confirmed that lithium phosphate recovered from mixed metal dust ('**MMD**') produced by Envirostream Australia Pty Ltd from recycled LIBs, can be used as a precursor to produce LFP, without any impact on physical or electrochemical properties.

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Authorised for release by the Board.

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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.

About Lithium Australia

Lithium Australia Ltd (ASX:LIT) is at the forefront of advanced materials development to ensure an ethical and sustainable future for the global battery industry. Lithium Australia is achieving this via its business divisions:

Envirostream (100%-owned LIT subsidiary): Envirostream, which is leading Australia's battery recycling industry, is at the cutting edge of delivering safe and innovative management solutions to one of the Australian waste industry's biggest (and getting bigger) challenges – battery disposal.

Its state-of-the-art Victorian-based battery processing facilities are providing a sustainable solution by collecting, sorting and processing critical battery metals from all types of spent batteries to power the batteries of tomorrow.

With battery recycling partnerships alongside some of Australia's leading brands (including Bunnings, Officeworks and Battery World), Envirostream benefits from the Australian government-backed battery recycling scheme which is providing rebates across collection, sorting, and processing of batteries. These combined provide the platform for national expansion.

VSPC (100%-owned LIT subsidiary): With over 20 years' experience, VSPC develops leading-edge materials for e-mobility and energy storage applications and, ultimately, a zero-carbon economy. Its patents cover the production of advanced powders for next generation lithium-ion batteries, especially lithium ferro phosphate ('LFP').

Currently, demand for LFP represents more than half the global market for lithium-ion battery materials. The Company is one of only a few entities outside of China with the technical expertise to manufacture LFP powder of the highest quality to meet those burgeoning market pressures.

VSPC is now on a clear path to production. With a Research & Development (R&D) facility (pilot plant) located in Queensland, a Definitive Feasibility Study ('DFS') for an initial 10,000tpa LFP manufacturing facility is well underway, and with customer offtake discussions advancing in parallel, VSPC is positioning for its first commercial footprint.