



19 October 2021

## VSPC's manufacturing capability now includes battery anode powders

### HIGHLIGHTS

- VSPC Ltd ('VSPC'), a developer and manufacturer of advanced cathode materials for lithium-ion batteries ('LIBs'), is now also producing commercial-quality lithium titanium oxide ('LTO') anode powder.
- The performance of VSPC's LTO exceeds industry benchmarks.
- Further research and development, including on niobium-based anode powders, is also underway at VSPC.

### Overview

A 100% -owned subsidiary of Lithium Australia NL (ASX: LIT, 'the Company'), VSPC is a developer of advanced battery materials, including lithium ferro phosphate ('LFP') and lithium manganese ferro phosphate ('LMFP') cathode powders. Its proprietary nanotechnology is the subject of international patents.

### VSPC's LTO

In addition to producing advanced LFP and LMFP cathode powders, VSPC's pilot plant has now manufactured high-quality LTO, an anode material required for high-performance LIB cells.

Conventionally, LTO is prepared via a solid-state reaction, with titanium dioxide (rutile or anatase) and lithium carbonate or lithium hydroxide as the raw materials. The materials are calcined at temperatures above 800° Celsius for a prolonged period (from 12 to 24 hours) to ensure high-phase purity.

Because VSPC's patented, slurry-based process reduces calcination time and ensures consistent phase- and end-product quality, it is ideal for producing LTO. Figures 1(a) & 1(b) below show VSPC's LTO powder at two different magnifications.

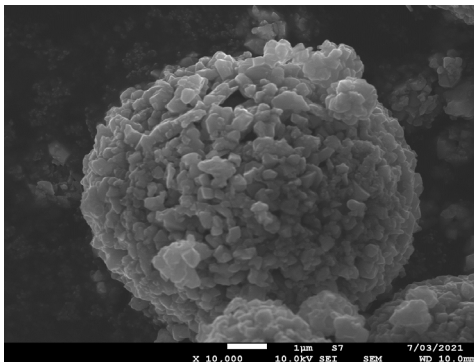


Figure 1(a) LTO (scale bar 1 µm)

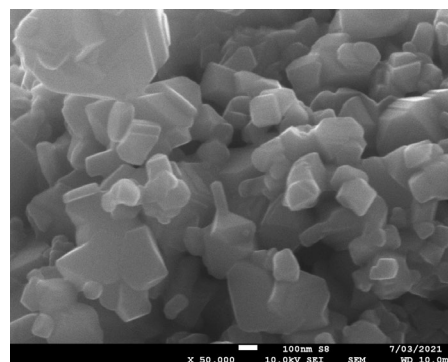


Figure 1(b) LTO (scale bar 100 nm)

ACN: 126 129 413

ASX: LIT

Level 1

677 Murray St  
West Perth WA 6005PO Box 1088  
West Perth WA 6872

Phone +61 (0) 8 6145 0288

Fax +61 (0) 8 9475 0847

info@lithium-au.com

lithium-au.com



## LTO benchmarking

When VSPC's LTO was benchmarked against five commercial LTO products, it achieved a specific capacity of 169 milliampere hours per gram ('mAh/g') at 0.1C\*.

Overall, VSPC's LTO achieved superior specific capacity when compared with other commercially available materials, including Tech9 LTO (used by battery research collaborators) and Hombitec LTO, acquired by VSPC prior to 2013.

Specific capacities for the VSPC and commercial LTO tested are shown in Table 1 below, while rate performance is illustrated in Figure 2.

LTO type	Specific capacity at 0.1C (mAh/g)
	Non-coated LTO (N2)
VSPC	169.5 ± 0.47
Tech 9	164.5 ± 1.19
Humite	167.0 ± 0.96
BTR	163.5 ± 0.51
Tianjin Plain Nano	166.5 ± 0.28
Fujian Kingshan	154.7 ± 0.65

Table 1. LTO specific capacity comparison at 0.1C rate  
 (\* C is a standard relating to the rate of charge and discharge).

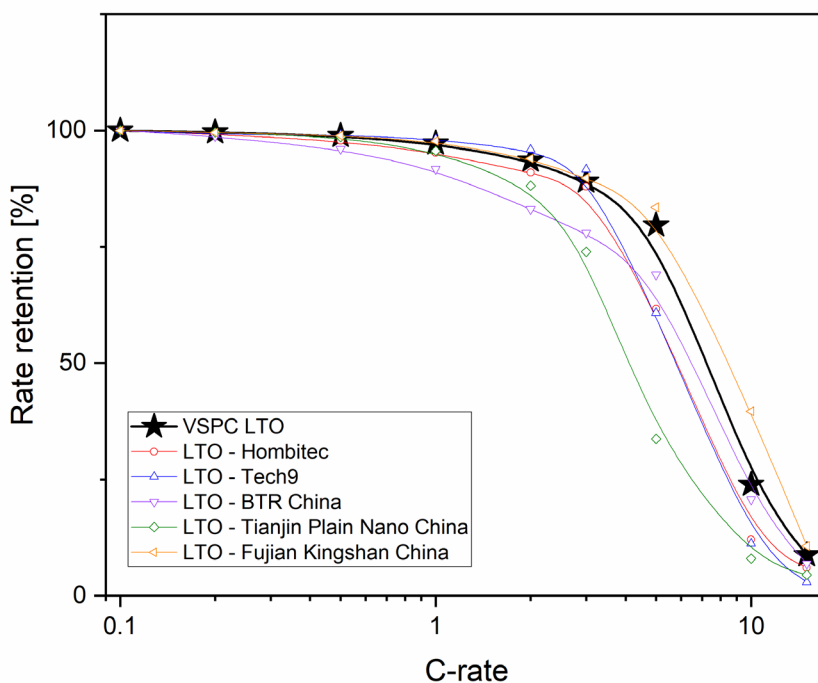


Figure 2. Rate performance – VSPC LTO and commercially available LTO.

For personal use only

## ASX ANNOUNCEMENT

**Further refinement and development**

As well as creating new market opportunities, VSPC's success with LTO has prompted it to expand its research into other anode battery materials, including titanium niobium oxide and other niobium-based anode materials often used in space and defense applications. VSPC is now developing an anode materials work programme in concert with other organisations that are leading research in this area.

**Comment from Lithium Australia managing director Adrian Griffin**

"To achieve the performance desired for next-generation LIBs, improved anodes are also required. VSPC's patented technologies are applicable to the production of both anode and cathode materials. Currently, VSPC produces the world's highest performing LFP cathode powder and is among only a handful of companies capable of producing high-energy-density LMFP. Market demand for advanced nickel- and cobalt-free batteries puts VSPC in a unique position to deliver precursors that meet more exacting performance requirements. VSPC's successful production of high-performance LTO is an Australian first, as well as a global necessity."

Authorised for release by the Board.

**Adrian Griffin**

Managing Director

Mobile +61 (0) 418 927 658

[Adrian.Griffin@lithium-au.com](mailto:Adrian.Griffin@lithium-au.com)

**Barry Woodhouse**

Company Secretary

Mobile +61 (0) 438 674 259

[Barry.Woodhouse@lithium-au.com](mailto:Barry.Woodhouse@lithium-au.com)

**About Lithium Australia**

Lithium Australia aims to ensure an ethical supply of energy metals to the battery industry by creating a circular battery economy that enhances both sustainability and resource security. Reprocessing spent lithium-ion batteries to create new ones is intrinsic to this plan, with the Company operating Australia's only fully integrated mixed-battery recycling business.

Having rationalised its portfolio of lithium projects/alliances, Lithium Australia continues its research into, and the development of, proprietary extraction processes for the conversion of *all* lithium silicates (including mine waste), and of fines generally discarded during conventional spodumene conversion, to lithium chemicals, from which it will produce advanced cathode materials for the battery industry globally.

The Australian federal government has recognised the Company's progress through the awarding of substantial research grants designed to progress the nation's advanced battery capabilities.

By uniting resources and innovation, Lithium Australia seeks to vertically integrate lithium extraction, processing and recycling.

**About VSPC**

VSPC operates a pilot plant in Brisbane, Queensland, Australia that is focused on developing and commercialising high-quality, advanced battery materials. Having

## ASX ANNOUNCEMENT



successfully demonstrated pilot-scale production of LFP and LMFP cathode materials, VSPC has further validated its proprietary nanotechnology by producing commercial-quality anode battery materials (LTO in particular) for use in high-performance LIBs. VSPC's research into, and development of, its suite of products is ongoing as it advances towards production on a commercial scale. A pre-feasibility study was completed in early 2021, with work on a growth strategy and definitive feasibility study currently underway. In September 2021, VSPC detailed its plans for an Australian operation in a Modern Manufacturing Initiative Collaboration grant application. Meanwhile, planning for VSPC's first international plant continues.

### 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.

### Media contact

Adrian Griffin, Lithium Australia NL

08 6145 0288 | +61 (0) 418 927 658