



Altech Chemicals
Limited

ASX ANNOUNCEMENT AND MEDIA RELEASE

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ALTECH – LAUNCH OF “SILUMINA ANODES” NAME FOR SILICON GRAPHITE ANODES

Highlights

- “Silumina Anodes” launched and registered as name for Altech’s composite anode material
- Reflects key differentiation point of the proposed product
- Incorporation of silicon in graphite battery anodes using alumina coating technology

Altech Chemicals Limited (Altech/Company) (ASX: ATC) (FRA: A3Y) is pleased to announce that it has launched and registered the product name **Silumina Anodes™** for its alumina coated composite silicon/graphite lithium-ion battery anode material.

Based on Altech’s test work, its *Silumina Anodes™* product is expected to provide for the manufacture of battery anodes, that when incorporated into a lithium-ion battery, result in a battery that has higher energy retention capacity by volume and weight compared to a battery using the incumbent graphite only battery anode. The key differentiation point of *Silumina Anodes™* is that it will be a composite material of silicon and graphite particles that have been coated with alumina, using Altech’s proprietary alumina coating technology.

Silumina Anodes™



At its Perth research and development laboratory, Altech has been successful in applying its alumina coating technology to both silicon and graphite particles, typical of those used in the anode of lithium-ion batteries. Altech’s laboratory test work has demonstrated that a lithium-ion battery using an anode comprised of composite graphite and silicon particles coated with alumina, improved battery energy capacity, energy retention, life and performance when compared to a conventional lithium-ion battery using a graphite only anode (the incumbent technology),

On 25 November 2021, the Company announced a significant breakthrough achieved by its research and development laboratory located in Perth, Western Australia. After almost 12 months of challenging work, the R&D team “cracked the silicon barrier” and successfully produced a series of lithium-ion battery anode materials, which when tested showed ~30% higher energy retention capacity compared to conventional graphite only lithium-ion battery anode material.

To achieve its breakthrough, Altech successfully combined silicon particles that had been treated with its innovative proprietary coating technology with regular battery grade graphite particles, to produce a lithium-ion battery electrode containing a composite graphite / silicon anode. When energised, these materials held 30% more capacity compared to a conventional graphite only anode material. Also, the previously unresolved obstacles for using silicon in lithium-ion battery anodes were, silicon particle swelling; prohibitive first-cycle-capacity-loss of up to 50%; and rapid battery degradation from each charge and discharge cycle. Each of these were also resolved during the laboratory testing of Altech’s composite graphite/silicon battery anode’s. Importantly, the batteries demonstrated extremely good stability and cycling performance over extended periods.

The lithium-ion battery industry has recognised that the required step change to increase lithium-ion battery energy density and reduced cost is to introduce silicon into battery anodes, as silicon has ~ ten times the energy retention capacity compared to graphite. Silicon metal has been identified as the most promising anode material for the next generation of lithium-ion batteries. However, until now silicon was unable to be used in commercial lithium-ion batteries due to two critical drawbacks. Firstly, silicon particles expand by up to 300% in volume during battery charge, causing particle swelling, fracturing and ultimately battery failure. The second challenge is that silicon deactivates a high percentage of the lithium ions in a battery. Lithium ions are rendered in-active by the silicon, immediately reducing battery performance and life. The industry has been in a race to crack the silicon barrier.

Altech’s potentially game changing technology has demonstrated that silicon particles can be modified to resolve the capacity loss caused by swelling and first-cycle-loss capacity. Phase 2 of Altech’s planned R&D program will see the Company strive to improve on the 30% energy increase achieved in the first phase.

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About Altech Chemicals (ASX:ATC) (FRA:A3Y)

Altech Chemicals Limited (ASX: ATC, "Altech" or "Company") is a specialty alumina technology and production company that has finalised Stage 1 and Stage 2 construction of its high purity alumina (HPA) plant in Johor, Malaysia, and continues with innovative research and development of its downstream alumina coating technology used to improve the battery life and performance in lithium-ion batteries. Altech's alumina coating technology is successful on both silicon and graphite particles, typical of those used in the anode of lithium-ion batteries, particularly within the burgeoning electric vehicle industry.

The Company has commenced a preliminary feasibility study (PFS) for the construction of a high purity alumina (HPA) battery materials coating plant in Saxony, Germany. The PFS is being undertaken by Altech's 75% owned German subsidiary, Altech Industries Germany GmbH (AIG). Work on the preliminary engineering design for the 10,000 tpa battery materials plant is in the final stages of completion. Altech has also commenced the green accreditation of the environmental credentials of the battery materials process.

Altech is further aiming to become one of the world's leading suppliers of 99.99% (4N) high purity alumina (Al_2O_3) through the construction and operation of a 4,500tpa high purity alumina (HPA) processing plant at Johor, Malaysia. Feedstock for the plant will be sourced from the Company's 100%-owned near surface kaolin deposit at Meckering, Western Australia and shipped to Malaysia.

HPA is a high-value, high-margin and highly demanded product as it is the critical ingredient required for the production of synthetic sapphire. Synthetic sapphire is used in the manufacture of substrates for LED lights, semiconductor wafers used in the electronics industry, and scratch-resistant sapphire glass used for wristwatch faces, optical windows and smartphone components. Increasingly, HPA is used by lithium-ion battery manufacturers as the coating on the battery's separator, which improves performance, longevity and safety of the battery. With global HPA demand approximately 19,000t (2018), it is estimated that this demand will grow at a compound annual growth rate (CAGR) of 30% (2018-2028); by 2028 HPA market demand is forecast to be approximately 272,000t, driven by the increasing adoption of LEDs worldwide as well as the demand for HPA by lithium-ion battery manufacturers to serve the surging electric vehicle market.

German engineering firm SMS group GmbH (SMS) is the appointed EPC contractor for construction of Altech's Malaysian HPA plant. SMS has provided a USD280 million fixed price turnkey contract and has proposed clear and concise guarantees to Altech for plant throughput and completion. Altech has executed an off-take sales arrangement with Mitsubishi Corporation's Australian subsidiary, Mitsubishi Australia Ltd (Mitsubishi) covering the first 10-years of HPA production from the plant.

Conservative (bank case) cash flow modelling of the HPA plant shows a pre-tax net present value of USD505.6million at a discount rate of 7.5%. The project generates annual average net free cash of ~USD76million at full production (allowing for sustaining capital and before debt servicing and tax), with an attractive margin on HPA sales of ~63%. (Refer to ASX Announcement "Positive Final Investment Decision Study for 4,500TPA HPA project" dated 23 October 2017 for complete details. The Company confirms that as at the date of this announcement there are no material changes to the key assumptions adopted in the study).

The Company has been successful in securing senior project debt finance of USD190 million from German government owned KfW IPEX-Bank as senior lender. Stage 1 and Stage 2 early works construction has been completed on time and on budget.



Forward-looking Statements

This announcement contains forward-looking statements which are identified by words such as 'anticipates', 'forecasts', 'may', 'will', 'could', 'believes', 'estimates', 'targets', 'expects', 'plan' or 'intends' and other similar words that involve risks and uncertainties. Indications of, and guidelines or outlook on, future earnings, distributions or financial position or performance and targets, estimates and assumptions in respect of production, prices, operating costs, results, capital expenditures, reserves and resources are also forward-looking statements. These statements are based on an assessment of present economic and operating conditions, and on a number of assumptions and estimates regarding future events and actions that, while considered reasonable as at the date of this announcement and are expected to take place, are inherently subject to significant technical, business, economic, competitive, political and social uncertainties and contingencies. Such forward-looking statements are not guarantees of future performance and involve known and unknown risks, uncertainties, assumptions and other important factors, many of which are beyond the control of the Company, the directors and management. We cannot and do not give any assurance that the results, performance or achievements expressed or implied by the forward-looking statements contained in this announcement will actually occur and readers are cautioned not to place undue reliance on these forward-looking statements. These forward-looking statements are subject to various risk factors that could cause actual events or results to differ materially from the events or results estimated, expressed or anticipated in these statements.