



Altech Chemicals
Limited

ASX ANNOUNCEMENT AND MEDIA RELEASE

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ALTECH – HPA MARKET UPDATE LITHIUM-ION BATTERY SECTOR

Highlights

- New emerging opportunity for HPA demand in the lithium-ion battery sector
- HPA directly coated onto lithium-ion battery anode and cathode
- Quality and consistency of HPA key for lithium-ion battery manufacturers
- HPA pricing at ~US\$40,000/tonne in Japan and South Korea
- Altech's proposed HPA product quality and capacity well received

Altech Chemicals Limited (Altech/the Company) (ASX: ATC) (FRA: A3Y) is pleased to provide details of recent developments and the outlook for high purity alumina (HPA) demand in the lithium-ion battery sector following its attendance at BATTERY OSAKA, a three-day international rechargeable battery exhibition held in Osaka, Japan.

BATTERY OSAKA is one of two international rechargeable battery exhibitions held in Japan each year, and is a significant event for the lithium-ion battery industry. The exhibition, now in its 5th year, attracts representatives from major lithium-ion battery manufacturers, materials suppliers and equipment suppliers that are mostly located in Japan, South Korea and China. Altech was fortunate to secure a large and predominant exhibition booth, which it manned in conjunction with Mitsubishi Corporation (Mitsubishi), Altech's exclusive HPA offtake partner. The exhibition ran from 26 to 28 September 2018.



Photo: Altech's Exhibition Booth - BATTERY OSAKA 2018

Lithium-ion Battery Sector: HPA Market Developments, Outlook, Supply and Price

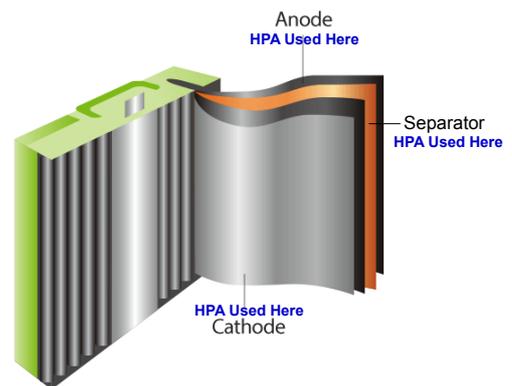
Direct coating of lithium-ion battery anodes and cathodes with HPA – an exciting new development

On 8 June 2018 Altech reported the faster than expected migration by lithium-ion battery manufacturers to HPA coated battery separators as a replacement for traditional non-coated plastic polymer separators. The report was based on new HPA market research and demand forecasts by London based CRU Consulting and Sydney based Petra Capital Pty Ltd, plus previous research and forecasts by Persistence Market Research and Altech. HPA coated lithium-ion battery separator sheets greatly increase the integrity of the separator – this allows a lithium-ion battery to operate at higher temperatures, it enhances heat dissipation and assists to prevent thermal run-aways, thereby increasing overall battery safety. The June 2018 report noted that the anticipated rapid transition of lithium-ion battery separator sheet manufacturers to HPA coated separator sheets is expected to deliver a higher than previously forecast (by Persistence Market Research and Altech) increase in HPA demand by 2025 from the lithium-ion battery sector.

However, from discussions with lithium-ion battery manufacturers in attendance at the Osaka battery exhibition, it was apparent that HPA is now increasingly being directly applied as an outer coating layer onto the anode and cathode materials used in lithium-ion batteries, in addition to being applied as a coating on polymer separator sheets.

Manufacturers explained that lithium-ion batteries with HPA directly applied to anode and cathode materials: maintain superior battery cycling behaviour; exhibit significantly reduced dendrite (crystalline mass) growth, enhanced thermal conductivity and reduced anode/cathode shrinkage and expansion. Dendrite formation in a lithium-ion battery is a major cause of battery failure, especially in high capacity batteries.

The direct application of HPA as a coating on lithium-ion battery anode and cathode materials is an exciting development that is likely to represent an additional market opportunity and demand driver for HPA.



Quality and Consistency are Critical

A predominant theme emanating from discussions with lithium-ion battery manufacturers at the exhibition was the importance of HPA purity and product consistency. Specifically, the lower the purity of HPA used in lithium-ion battery coating applications, the higher the possibility of battery failure and degradation, reduced cycling behaviour and/or reduced conductivity. Consistency of HPA quality was also emphasised in discussions, with any variability in material quality being potentially problematic to lithium-ion battery manufactures in the production process. It is for these reasons that little if any low quality HPA was reported as being used by lithium-ion battery manufacturers in the Japan and South Korea, in spite of lower pricing of lower quality material.

Overall, potential end-users of Altech's HPA were impressed with the proposed product specifications, which they believed are highly suited to their proposed applications. It is currently estimated that less than 2kg of HPA would be used in an electric vehicle lithium-ion battery, this represents a total cost of less that US\$100 per vehicle; a seemingly small price to pay for certainty of battery life, quality and safety.

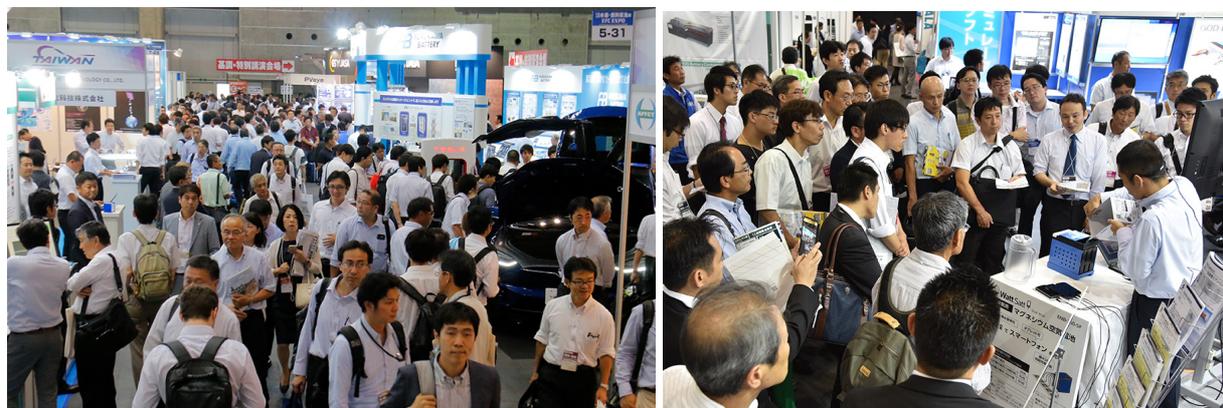
Looming HPA Supply Concern

A lithium-ion battery industry exhibition attendee from South Korea directly raised with Altech the industry's concern about future HPA supply given current HPA usage and demand trends. Specifically, the attendee identified the lack of diversity of HPA supply into the South Korean market, where Japanese HPA manufacturer Sumitomo and its South Korean subsidiary dominate supply. Major South Korean lithium-ion battery manufacturers include Samsung SDI, LG Chem and SK; South Korea is currently one of the world's leading lithium-ion battery manufacturing countries. In the attendee's opinion, a new high quality HPA producer such as Altech would be a much-needed addition to HPA supply diversity for the South Korean and Japanese markets. Mitsubishi and Altech plan to advance discussions with several of the lithium-ion battery manufacturers in the near future as part of ongoing marketing efforts.

Current HPA Pricing

Several Japanese and South Korean buyers at the exhibition were able to confirm that the prevailing market price for the highest consistency and quality 4N HPA (99.99%), typically from Japan, is around US\$40,000 per tonne. The Mitsubishi representative in attendance at the exhibition also reported this level of pricing. Altech has used US\$27,000 per tonne in its definitive feasibility study (DFS) financial model and bank financial model. As previously reported, if the current 4N HPA price of US\$40,000 per tonne was applied to the Company's DFS financial model, the Company's HPA project would report an IRR of ~33% and generate EBITDA of ~US\$133 million per annum at name plate production of 4,500tpa.

Photo: Battery Osaka 2018 Exhibition



Altech managing director, Mr Iggy Tan said “a key take away from the Battery Osaka exhibition is that the HPA market appears to be evolving in line with forecasts from groups such as CRU and Persistence Market Research and if anything perhaps a little stronger than forecast – this is positive for Altech. HPA is a speciality high quality material, which attracts premium pricing because it is critical to the manufacture of high quality lithium-ion batteries – such as are used in electric vehicles. The cost of HPA in a lithium-ion battery for an electric vehicle is insignificant, but a compromise in HPA quality may result in catastrophic consequence such as a thermal runaway. Altech intends to operate at the premium end of HPA market and does not see low quality HPA producers as competitors. Our main target market has always been Japan, South Korea and Taiwan. It is apparent that HPA pricing continues to be strong and consistent in these markets.”

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For more information, please contact:

Corporate

Iggy Tan

Managing Director
Altech Chemicals Limited
Tel: +61 8 6168 1555
Email: info@altechchemicals.com

Shane Volk

Company Secretary
Altech Chemicals Limited
Tel: +61 8 6168 1555
Email: info@altechchemicals.com

Investor Relations (Europe)

Kai Hoffmann

Soar Financial Partners
Tel: +49 69 175 548320
Email: hoffmann@soarfinancial.com
Wir sprechen Deutsch.

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

Altech Chemicals Limited (Altech/the Company) is aiming to become one of the **world's leading suppliers of 99.99% (4N) high purity alumina (HPA)** (Al_2O_3).

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. There is no substitute for HPA in the manufacture of synthetic sapphire.

Global HPA demand is approximately 25,315tpa (2016) and demand is growing at a compound annual growth rate (CAGR) of 16.7% (2016-2024), primarily driven by the growth in worldwide adoption of LEDs. As an energy efficient, longer lasting and lower operating cost form of lighting, LED lighting is replacing the traditional incandescent bulbs.

Current HPA producers use expensive and highly processed feedstock materials such as aluminium metal to produce HPA. Altech has completed a Final Investment Decision Study (FIDS) for the construction and operation of a 4,500tpa HPA plant at the Tanjung Langsat Industrial Complex, Johor, Malaysia. The plant will produce HPA directly from kaolin clay, which will be sourced from the Company's 100%-owned kaolin deposit at Meckering, Western Australia. Altech's production process will employ conventional "off-the-shelf" plant and equipment to extract HPA using a hydrochloric (HCl) acid-based process. Production costs are anticipated to be considerably lower than established HPA producers.

The Company is currently in the process of securing project financing and has announced the execution of an agreement with its appointed EPC contractor SMS group for the commencement of stage 1 construction of its HPA plant in Johor, Malaysia.



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.