

ALPHA-EN'S PRE-LITHIATED ANODE BOOSTS BATTERY PERFORMANCE

Yonkers, New York 7/21/2020 alpha-En Corp, with its patented technology of electroplating lithium metal films, today announced that it has demonstrated the application of its core technology to pre-lithiate composite graphite anode laminates in the laboratory scale, which led to considerably improved performance of existing lithium ion batteries in terms of delivered capacity (10-20%).

Lithium ion batteries (LIBs) typically show significant irreversible loss of active lithium (10-20%) during the first charge cycle due to the inevitable formation of a solid electrolyte interphase (SEI) layer as a result of electrolyte reduction over anode surface.

Since, LIBs are capacity limited by the amount of lithium incorporated in the starting expensive cathode component, the first cycle loss of active lithium considerably reduces the deliverable capacity. Pre-lithiation, by which an anode is partially pre-loaded with lithium before cell assembly to counter the first cycle irreversible loss of active lithium, is an effective way of achieving significantly increased cell capacity, which will lead to a proportional gain in energy density. For example, widespread adoption of a cost effective, safe and scalable pre-lithiation approach would expectedly take energy density of current LIBs close to 300 Wh/kg.

More importantly, the idea of pre-lithiation would be even more relevant for successful commercial adoption of alternate high capacity anodes (e.g. silicon, carbon-silicon composite etc.) in LIBs, which typically exhibits far more first cycle irreversibility and poor cycling efficiency in general compared to graphite anodes. Successful adoption of pre-lithiation strategy on such anodes would potentially increase the energy density of LIBs beyond 350 Wh/kg, a number generally targeted for widespread commercial adoption of electric vehicles (EVs). In this context, alpha-En's successful demonstration of significant performance improvement in cell level employing a proprietary pre-lithiation process is a step forward towards its market adoption. Leveraging alpha-En's proprietary dual compartment electrochemical cell, pre-lithiation on composite anode laminates is essentially achieved in a single step by sourcing lithium from cheap aqueous feedstock containing Li_2CO_3 mediated through a lithium-ion transport specific ceramic membrane.

This process is completely compatible with the installed base of electrode and cell manufacturing with an additionally offline or potentially inline step of pre-lithiating the anode web in a roll to roll process. This process is also totally compatible with lithium salts formed in the recycling of lithium batteries by the hydrometallurgical metal separation process under development. As a result, leading battery companies could take advantage of lower quality cathode materials and lithium salt byproducts associated with the recycling of lithium batteries while improving cell capacity and energy density.

Sam Pitroda, Chairman and CEO added: "We are very excited about this new application of our technology and look forward to working with leading battery companies worldwide on bringing this

innovation into the marketplace as soon as possible. While we add more applications to our product family, we continue to pursue our primary initiatives in lithium metal anodes and hydrometallurgical recycling of lithium ion batteries and hope to be able to report progress there as well in spite of the difficult circumstances due to the pandemic. We remain grateful for the continued support of our shareholders.”