

# HPA Enhanced Anode Coatings for Lithium-ion Battery Market

## FYI AND ECOGRAF LIMITED TO COLLABORATE ON DEVELOPMENT OF HPA-CARBON COATINGS FOR THE LITHIUM-ION BATTERY MARKET

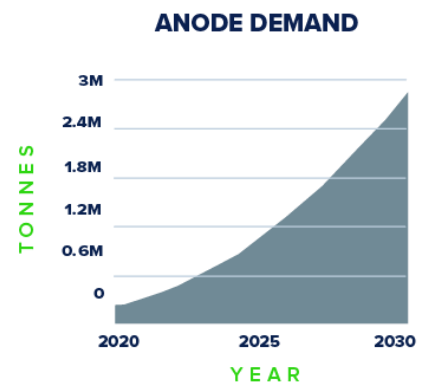
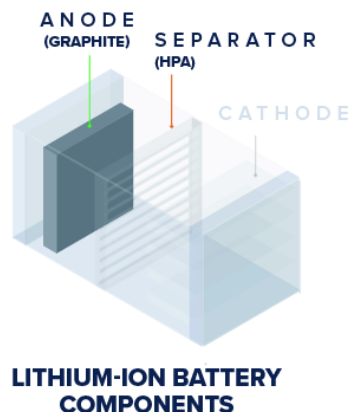
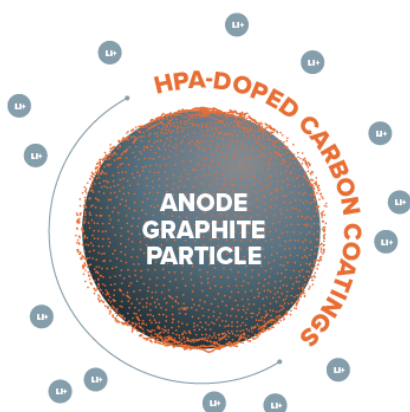
Emerging high quality HPA producer, FYI Resources Limited (ASX: **FYI**) or (the **Company**) is pleased to announce it has signed a non-binding Memorandum of Understanding (**MoU**) with emerging graphite producer, EcoGraf Limited (**EcoGraf**) (ASX: **EGR**) to develop High Purity Alumina (**HPA**) doped carbon coatings material for application in the burgeoning lithium-ion battery market.

HPA's most common application in battery technologies is in a ceramic (HPA / alumina) form as a coating on the separator membranes within the battery cell. The HPA coated separators improve battery chargeability (charging and discharging rates), performance (power density), safety and overall service and durability. Increasingly, however, there is a growing number of HPA focused applications due to the material's unique qualities and purity. One of these uses is directed at the anode, particularly in lithium-ion batteries, as a result of the observed increase in battery life and performance from the high purity HPA coating applied to the anodes' graphite particles.

Initial research has demonstrated HPA-doped carbon coatings on battery anodes enhances the performance of batteries<sup>1</sup>. Research indicates that the HPA coating vastly minimizes the first cycle power loss during battery charge and discharge cycles due to the effect of the protective HPA layering.

Lithium-ion battery anodes are composed of both synthetic and naturally sourced graphite, carbon black and silicon. HPA is used as a nano thickness, thin coating on the separator sheets used within a lithium-ion battery, as alumina coated separators improve the ability to withstand high rate of discharge, battery performance durability, and overall safety. The separator combined with the anode materials is the major raw material in the lithium-ion battery.

The battery anode coatings market is a significant value proposition given the forecast demand for anode materials.



Source: Benchmark Minerals



The MoU sets out a technical program, which will include FYI's HPA and EcoGraf's purified spherical graphite (**SpG**).

The initial technical program to produce and evaluate high purity alumina-doped carbon coated SpG will include:

- Development of the efficient utilisation of HPA and/or its ceramic derivatives and formulation as a coating precursor for battery anode material and separators;
- Development of an appropriate ALD Coating (Atomic Layer Deposition) process using HPA as coating precursor specific to EcoGraf high purity SpG; and
- Battery Coin Cell testing development program for evaluating the performance of HPA ceramic coated EcoGraf™ SpG

Funding of the technical program will be shared equally. The FYI and EGR research collaboration will also include evaluation of alumina and graphite composites for new battery technologies and materials in clean energy applications.

Subject to successfully completing the testwork programs, the parties will then agree on the key commercial principles for further collaboration.

FYI are in discussion with Alcoa of Australia Limited negotiating a possible joint venture (JV) regarding FYI's innovative high quality HPA refining process. The JV discussions include participating in selected potential downstream and value-add HPA development and commercialisation opportunities within the electric vehicle, static power, LED and other niche HPA market segments.

FYI and EcoGraf look forward to reporting the programs and the results as they progress.

*Note 1, Synthesis of Alumina-Coated Natural Graphite for Highly Cycling Stability and Safety of Li-Ion Batteries January 2019, Journal of Chemistry. DOI:10.1002/cjoc.201800559*

This announcement is authorised for release by the Board of FYI.

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### **About FYI Resources Limited**

FYI's is positioning itself to be a significant producer of 4N and 5N HPA in the rapidly developing high-tech product markets.

FYI applies both an ESG and economic overlay of the Company and its operations to ensure long-term sustainable and shareholder value is created via the development of the Company's innovative, high quality, ultra-pure HPA project.

HPA is increasingly becoming the primary sought-after input material for certain high-tech products principally for its unique properties, characteristics and chemical properties that address those applications high specification requirements such as LED's and other sapphire glass products.

The longer-term driver for HPA, with forecasts of >17% CAGR\*, is the outlook for the burgeoning electric vehicle and static energy storage markets where the primary function is in the use as a separator material between the anode and cathode in batteries to increase power, functionality and safety of the battery cells.

The foundation of the HPA strategy the Company's moderate temperature, atmospheric pressure innovative process flowsheet. The strategy's quality attributes combine resulting in world class HPA project potential.

\* CRU HPA Industry Report 2021

### **About EcoGraf Limited**

EcoGraf is building a diversified HFfree vertically integrated battery anode material business to produce high purity battery anode materials for the lithium-ion battery markets. The first new state-of-the-art EcoGraf facility in Australia will manufacture spherical graphite products for export to Asia, Europe and North America using a superior, environmentally responsible HFfree purification technology to provide customers with sustainably produced high performance battery anode material.

In addition, the company's breakthrough recovery of carbon anode material from recycled batteries using its EcoGraf™ process will enable the recycling industry to reduce battery waste and use recycled carbon anode material to improve battery lifecycle efficiency.

To complement these battery graphite operations, the Company is also advancing the TanzGraphite natural flake graphite business, with development of the Epanko Graphite Project, which will supply additional feedstock for the battery anode material facilities and provide customers with a long-term supply of high-quality graphite products for industrial applications such as refractories, recarburisers and lubricants

