

ASX Announcement (ASX:AXE)

30 March 2020

Coated spherical graphite for lithium-ion batteries

Highlights

- High-value coated spherical graphite (“CSG”) is produced using natural flake graphite from Archer’s 100% owned Eyre Peninsula Graphite Project.
 - CSG materials successfully tested in lithium-ion battery prototypes with enhanced performance in-line with industry benchmarks for CSG anodes.
 - Archer to pursue downstream partnership and development opportunities with lithium-ion battery manufacturers, graphite processing options, and high-value graphene and graphitic materials.
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Archer Materials Limited (“Archer”, “Company”, ASX:AXE) is pleased to announce that natural flake graphite from the Company’s 100% owned Eyre Peninsula Graphite Project (“EPGP”, “Campoon”) has been successfully used to produce coated spherical graphite (Image 1) and tested in proof of concept lithium-ion battery cells. The EPGP mineral resource is located approximately 220km northwest of Adelaide, South Australia.

Commenting on the development, Archer CEO Dr Mohammad Choucrair said, “Graphite is a mineral categorised by many world economies as ‘critical’ and important to their long-term economic growth and supply-chain security. We have demonstrated high-value graphite materials can be developed from Campoon and are relevant to the growing global markets serviced by lithium-ion batteries, including electric vehicles and portable electronics.

“As a materials technology company, we believe securing critical mineral assets in Australia, like our 100% owned EPGP graphite resource, is a good economic decision, and through successful development could return maximum benefit to shareholders and the community.”

Spherical Graphite Coating and Battery Testing

Coated spherical graphite (“CSG”) is one of the highest value-added processed forms of flake graphite concentrate used in the lithium-ion (“Li-ion”) battery industry (see *Background and Market*). A commercially available amorphous carbon material was used to coat Archer’s spherical graphite (95% and 99%+ concentrates from Campoon) by applying industry accepted methods and the CSG performance tested in Li-ion battery coin cells in half-cell configuration i.e. only the performance of the CSG in the anode was tested.

The CSG materials were characterised using spectroscopy, microscopy, and diffraction methods, which confirmed the coating process was successful (Image 1). The anode performance was in-line with industry benchmarks for CSG materials, including for reversible capacities and few-cycle capacity retention. The CSG could potentially be more conducive to process efficiencies compared to spherical graphite alone, as the reversible discharge capacities could be achieved with a reduction in electrode loadings (i.e. mass to volume/area).

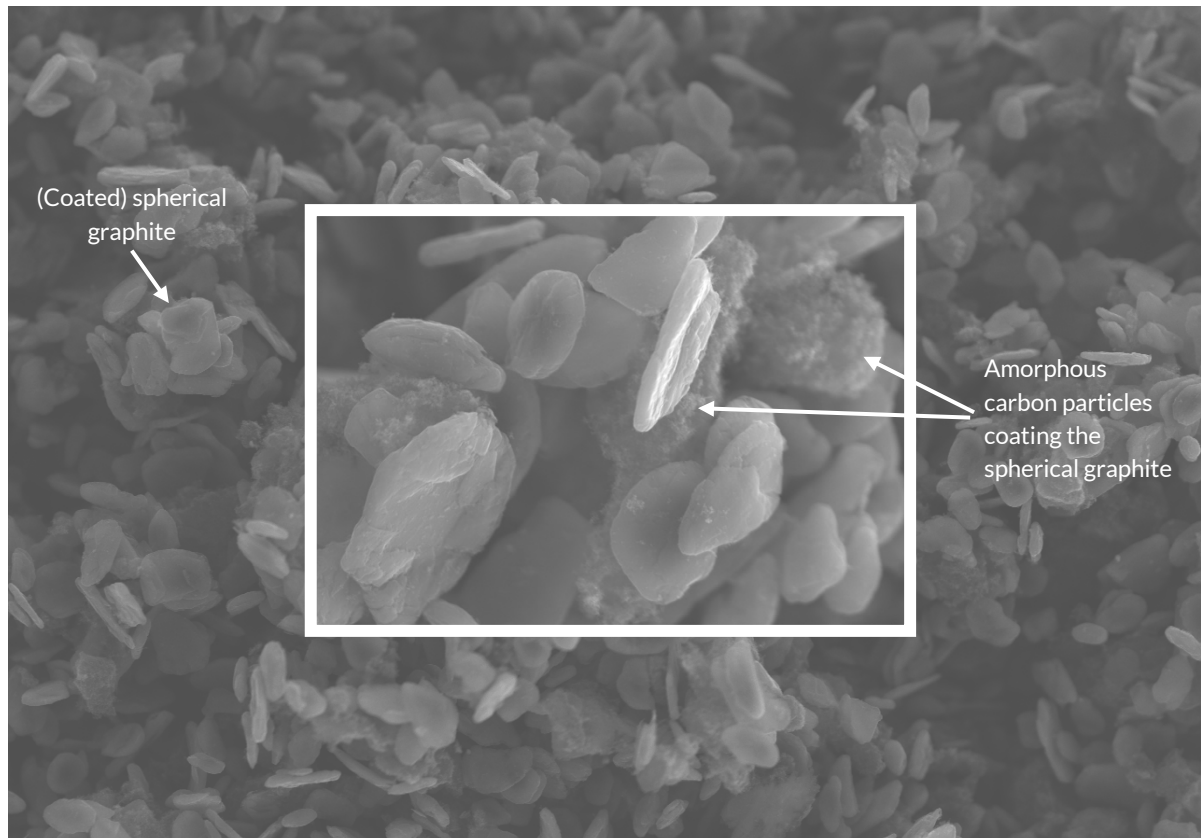


Image 1. Scanning electron microscope images of a region a sample of CSG produced from Campoona graphite. The foreground imaged (centre) is a magnification of the extensive micron-scale sample region (background) showing the rounded spherical graphite coated in amorphous carbon particles. The CSG retains its high-value properties despite undergoing processing.

Next Steps

Archer will use the outcomes of the CSG testing to pursue commercial opportunities for end-use integration in the Li-ion battery supply chain with potential EPGP co-development partners to ensure that the Company can successfully add value to Campoona, and that the project can be developed to return maximum benefit to shareholders and the community.

Background and Market

Significant progress has been made and announced to ASX by Archer on the development of the EPGP since the **granting of a Mineral Lease** (ASX Ann. Dec 1, 2017):

- Campoona graphite:
 - + is structurally near-perfect down to the atomic scale (6 Apr 2018);
 - + is a versatile feedstock to high-value graphene materials (23 Jul 2018);
 - + can be used to produce commercially scalable full-cell configuration Li-ion batteries (21 Aug 2018);
 - + can be converted into high value spherical graphite for integration into Li-ion batteries (12 March 2019);
- Archer has submitted a Program for Environment Protection and Rehabilitation ("PEPR") (2 Dec 2019) and maintains a compliant Mineral Lease.

Graphite is listed as a critical mineral by Australia, the US, EU, and Japan. Australia's demonstrated economic resource is approximately 7140 kilo tonnes¹, however graphite is not currently produced in Australia. Global production of graphite is estimated at 1200 kilo tonnes with a global market value of over US\$1 billion².

Li-ion batteries consist of a group of batteries which operate with graphite in the anode³. Improvements in the anode, including those reported in this announcement, offer significant commercial development potential, and are based on using graphite with high structural quality and purity, and an appropriate particle size and optimal morphology for effective lithium-ion intercalation chemistry, like that demonstrated with Campoona graphite.

More information and details on the EPGP can be found in the [Company's Annual Report](#).

About Archer

A materials technology company developing materials in quantum computing, biotechnology, and lithium-ion batteries, and exploring for minerals in Australia. The Company has strong intellectual property, broad-scope mineral tenements, world-class in-house expertise, a diverse advanced materials inventory, and access to over \$300 million of R&D infrastructure.

The Board of Archer authorised this announcement to be given to ASX.

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¹<https://www.industry.gov.au/sites/default/files/2019-03/australias-critical-minerals-strategy-2019.pdf>

²<https://comtrade.un.org/>

³<https://onlinelibrary.wiley.com/doi/full/10.1002/9781119951438.eibc2300>