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A Path to Industrial Scale Graphene Supply and Commercialisation

Many fundamental properties of graphene are well understood and applied material research has demonstrated graphene as an additive to current materials can make products stronger, lighter or more functional such as electrically or thermally conductive.

This presents a special opportunity to positively improve, and in some cases, revolutionise, the performance, applications and environmental impact of many products.

But preparing industrial scale volumes of graphene at economic cost has proven problematic. Many production techniques have limitations including (in no particular priority) cost, volume, yield, process toxicity, high energy inputs, limited particle size, oxidation and defect level among many others.

Since 2014 Talga has been developing a route of graphene production to solve this supply problem. By innovatively mining a unique natural crystalline carbon source in Sweden, and matching it to a scalable exfoliation process, large volumes of pristine and high quality graphene nanoplatelets (GNP) can be produced.

The continued success of this method is un-shackling the supply and cost constraint from graphene, enabling use in large volume additive applications across the coatings, energy, construction and composites sectors.

In contrast to raw material supply, Talga has accelerated the graphene commercialisation process by forming its own product development division in the UK and making prototype products with which to engage industry. Results of testing these prototypes is presented.

Figures

MARKET OPPORTUNITY FOR GRAPHENE



In addition to raw materials, Talga is focused on the manufacture and commercialisation of targeted products across 4 key industry sectors



Construction additives

Advantages

- Improves strength, durability and impermeability
- Imparts electric and thermally conductive properties
- Reduces concrete used and decreases industry CO2 emissions
- Enables underground power transmission cables, underfloor heating, road and bridge snow melting and de-icing

Immediate market opportunity
US\$17bn specialty concrete



Energy storage (batteries)

Advantages

- Enables higher performance and lower cost Li-ion, flow and alkaline batteries.
- Flexible, printable batteries for 'Internet of Things' and 'Wearable' devices
- Lower toxic footprint by enabling water-based battery chemistry
- Lower cost fuel cells

Immediate market opportunity
US\$24bn battery market



Talphone™ enhanced coatings

Advantages

- Eco-friendly alternative to toxic chromium based coatings
- Lower cost and superior performance with reduction in zinc, copper, phosphate, zirconia
- Corrosion protection increased by up to 74% for mild steel
- Eco-friendly marine anti-fouling

Immediate market opportunity
US\$22bn corrosion protection sector within global US\$120bn



Carbon fibre composites/resins

Advantages

- Stronger and lighter epoxy resin systems for carbon fibre and polymer composites
- Enables lightning strike protection and EM shielding in carbon fibre planes and EV's
- Replaces copper heating elements/wires to reduce weight of EV's

Immediate market opportunity
US\$18bn composites sector

Market size sources: Reports from IDTechX, Freedonia, www.corrosion.org, Market and Markets, Future Markets Insight, BCC research, www.energy.gov, www.cam.ac.uk