# Graphene Provides Multiple Benefits to Lubricant Applications

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Rarely in history are investors given the opportunity to participate in the development of an emerging revolutionary technology from the ground floor.

That industry is graphene. And, thanks to advancements in nanotechnology, chemistry, and manufacturing processes, graphene is poised to become an invaluable raw material in the manufacture and functionality of an almost limitless array of products in almost every industry.

Graphene, a commercially viable "super-material," is stronger than steel, harder than diamond, more conductive than copper, and has better electron mobility than silicon. Its markets and applications are nearly limitless — it is added to other materials to improve strength, water resistance, flexibility, and electrical conductivity, and it promotes clean energy by improving battery, solar panel, and supercapacitor technology.

Lubricants, coatings and resins are three important markets using graphene.

According to Grandview Research, the global coatings market, which is expected to be worth US$83 billion in 2021, will grow at a 3.5% CAGR through 2030. Due to the rising demand for higher-performance lubricants, the US$130.03 billion lubricants industry in 2021 will grow at a 3.7% CAGR through 2030.

Meanwhile, the thermoplastic resin market is expected to grow at a 7.7% CAGR to US$40.06 billion by 2030, owing to their higher heat tolerance, greater fatigue resistance, and being 30%-40% lighter than aluminum. Meanwhile, Vantage Market Research predicts that the global graphene market will be worth $2.5 billion by 2028.

Graphene is one of the most notable nanomaterials that is widely being tested as a lubricant additive. Historically, graphite, graphene's parent material, has been widely used in this application. Graphene is a single material that can be added at fractions of a percent to provide several key advantages that can be valued by the full user spectrum.

For lubricating oil applications in general, graphene can deliver the following improvements: reduced friction; decreased mechanical & thermal wear; corrosion prevention; improved lubricant stability and performance under elevated temperature, shear, and pressure conditions; life extension of the lubricant and the engine components; improved fuel efficiency; boosted engine performance, and reduction in oil change and maintenance frequency.

Because of these properties, graphene has a distinct advantage for use as a lubricant additive. Furthermore, graphene nanoplatelets (GNPs) are entirely made of carbon and do not contain any toxic elements like phosphorus or sulfur. As a result, they may be considered environmentally friendly.

However, a lack of commercial-scale volumes of consistently high-quality graphene has hampered full market acceptance and widespread use, but new innovations in the production of graphene are ready to address these issues.

Thanks to the production innovations developed by HydroGraph Clean Power (CSE:HG) (OTC:HGCPF) and their proprietary Hyperion Detonation System, graphene can now be mass produced consistently and economically enough to be widely adopted.

**Disrupting the Graphene Industry**

HydroGraph is one of the world's purest graphene producers and is currently positioned to be a global leader in commercializing graphene on a large scale.

HydroGraph's technology uniquely positions the company for multiple high-growth, multi-

billion-dollar markets in graphene, hydrogen, and other strategic materials production.

The Hyperion system is a scalable, modular, customizable, and cost-effective reactor unit. As a result, it generates nearly 100% pure carbon-content graphene with minimal energy consumption, no solvents, and zero carbon emissions.

What’s more, graphene from HydroGraph can be easily integrated into an infinite number of products, such as lubricants, energy storage anodes, lithium batteries, solar cells, supercapacitors, and functional coatings.

The initial target markets for HydroGraph are resins, lubricants, and coatings, which can be used to improve product durability, strength, and performance significantly. HydroGraph's graphene, in particular, has shown excellent performance in lubricant applications, including friction factor reduction by up to 55% and decreased mechanical wear by up to 70%.

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