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The Global Market For Graphene and 2-D Materials Technologies, Production, End User Markets and Opportunities Analysis, 2015-2025

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Abstracts

Graphene exhibits a unique combination of mechanical, thermal, electronic and optical properties that provide opportunities for new innovation in flexible displays, transistors, photosensors, RFID tags, solar cells, secondary batteries, fuel cells, supercapacitors, conductive inks, EMI shielding heat insulation, anti-oxidation, LEDs across multiple industries including consumer electronics, automotive, aerospace, medicine, energy, 3D printing, polymer composites, wireless technology, filtration and coatings.

Graphene possesses (theoretically) record high electrical and thermal conductivity, transparency at all wavelengths, flexibility and outstanding mechanical strength.

The global market for graphene continues to grow with weekly technology and production breakthroughs, new public and private investments and public listings of graphene producers. There are now over 150 companies either producing graphene or developing applications, with as many multi-nationals conducting R&D on these materials.

Relatively few graphene products have reached the market as yet, and until recently those that have mainly incorporate graphene additives to enhance toughness and flexibility. Products include smartphone touchscreens (Wuxi), tennis rackets (Head), bicycle rims (Vittoria), flexible battery straps and printed RFID antennas (Vorbeck), paint (Graphenstone), cycle helmets (Catlike), thermometers (Linktop Technology) and oil-drilling muds (Graphene Nanochem).

However, a number of energy related products have hit the market in 2015, including Zap&Go, a graphene supercapacitor that can help extend the battery life of

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smartphones, produced by Zapgocharger. Skeleton Technologies has also launched a graphene-enhanced supercapacitor with a capacitance of 4500 farads.

Graphene Lighting PLC has announced that a graphene light bulb with lower energy emissions, longer lifetime and lower manufacturing cost will be launched in 2015. In March, Graphene 3D Labs, Inc. announced the commercial availability of 3D graphene filaments for 3D printing applications. Sher-Wood Hockey has announced they are bringing a graphene-enhanced carbon fibre Rekker EK60 hocky stick to market. UK company Xefro has created a graphene-based heating system that can reduce energy costs up to 70 per cent. The product, gRAD, uses graphene as a heating element. Graphene Nanochem recently won a $28 million order from an oil company for its PlatDrill Series drilling fluid.

There is likely to be significant short-term opportunities in applications such conductive formulations and inks for printable electronics, coatings and electronic textiles; anti-corrosion coatings; current collector and separator coatings; thermal management; Li-ion batteries; Li-S batteries; supercapacitors (mainly for mobile electronics applications); EMI shielding materials and in anti-static and mechanical reinforced composites and barrier films. In most of these applications scale-up is relatively straightforward and performance benefits have been clearly demonstrated.

Medium-term growth will be witnessed in sensors and desalination membranes. Longer-term bets are in organic electronics applications (OLED, displays and solar PV), semiconductors and biomedicine. For graphene to meets its outstanding potential a number of significant challenges most be overcome. Low cost production processes must be developed and these production processes must be both scalable and suitable for integration into existing manufacturing processes and regulations. The challenges of consistently integrating graphene into products, either as graphene compounds or graphene components must also be met. Graphene also faces competition from incumbent materials such as carbon black, graphite and activated carbon that are relatively cheaper at present and already large-volume commodities.

WHAT DOES THE REPORT INCLUDE?

Comprehensive quantitative data and forecasts for the global graphene market to 2025

Qualitative insight and perspective on the current market and future trends in end user markets based on interviews with key executives

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End user market analysis and technology timelines

Financial estimates for the markets graphene will impact

Patent analysis

Tables and figures illustrating graphene market size

Full company profiles of graphene producers and application developers including technology descriptions and end user markets targeted

Profiles of prominent research centres

Industry activity and breakthroughs by market 2013-2015

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