

## **NanoMalaysia - National Graphene Action Plan 2020**

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Malaysia's aspiration to become a high-income nation by 2020 with improved jobs and better outputs is driving the country's shift away from "business as usual," and towards more innovative and high value add products. Graphene, an emerging, highly versatile carbon-based nanomaterial, presents a unique opportunity for Malaysia to develop a high value economic ecosystem within its industries. Isolated only in 2004, Graphene's superior physical properties such as electrical/ thermal conductivity, high strength and high optical transparency, combined with its manufacturability have raised tremendous possibilities for its application across several functions and make it highly interesting for several applications and industries. Currently, Graphene is still early in its development cycle, affording Malaysian companies time to develop their own applications instead of relying on international intellectual property and licenses. Faced with the need to push forward a multitude of development priorities, Malaysia must be targeted in its efforts to capture Graphene's potential, both in terms of "how to compete" and "where to compete". This National Graphene Action Plan 2020 lays out a set of priority applications that will be beneficial to the country as a whole and what the government will do to support these efforts. Since any innovation action plan has to be tailored to the needs and ambitions of local industry, Malaysia will focus its Graphene action plan initially on larger domestic industries (e.g., rubber) and areas already being targeted by the government for innovation such as energy storage for electric vehicles and conductive inks. In addition to benefiting from the physical properties of Graphene, Malaysian downstream application providers may also capture the benefits of a modest input cost advantage for the domestic production of Graphene.

NanoMalaysia Berhad (NanoMalaysia) has been appointed as the Lead Agency to execute the National Graphene Action Plan 2020, aligned with their mandate to nurture nanotechnology development and its commercialization. At this juncture, timing is the key determinant in making sure Malaysian companies has the first mover advantage to enable them to move up the value chain and gaining access to the global market. To conduct a comprehensive analysis, a wide variety of application areas for Graphene were considered. These applications were assessed for technological feasibility by 2020, total size of the opportunity globally and relevance to Malaysia. Based on these criteria, five applications were selected as initial priority focus areas for Malaysia: lithium-ion battery anodes and ultracapacitors, rubber additives, nanofluids (drilling fluids and lubricants), conductive inks, and plastic additives. Together, these applications have the potential to contribute to achieving additional gross national income impact of more than RM 20 billion and to help create 9,000 new jobs for these industries in Malaysia by 2020.