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## NPL Develop ISO/IEC Standard for Measuring Graphene Structural Properties

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The National Physical Laboratory (NPL), in collaboration with international partners, have developed an ISO/IEC standard, ISO/TS 21356-1:2021, for measuring the structural properties of graphene, typically sold as powders or in a liquid dispersion. The ISO/IEC standard allows the supply chain to answer the question 'what is my material?' and is based on methods developed with The University of Manchester in the NPL Good Practice Guide 145.

Over the last few years, graphene, a 2D material with many exciting properties and just one atom thick, has moved from the laboratory into real-world products such as cars and smartphones. However, there is still a barrier affecting the rate of its commercialisation, namely, understanding the true properties of the material. There is not just one type of material, but many, each with different properties that need matching to the many different applications where graphene can provide an improvement.

With hundreds of companies across the globe selling different materials labelled as 'graphene', and manufacturing it in different ways, end users who want to improve their products by incorporating few-layer graphene flakes are unable to compare and subsequently select the right material for their product.

Through standardised methods to enable the reliable and repeatable measurement of properties, such as the lateral flake size, flake thickness, level of disorder and specific surface area, industry will be able to compare the many materials available and instil trust in the supply chain. In conjunction with the international ISO/IEC terminology standard led by The National Physical Laboratory ([NPL](#)), [ISO/TS 80004-13:2017](#), it will be possible for commercially available material to be correctly measured and labelled as graphene, few-layer graphene or graphite.

As the [UK](#)'s National Metrology Institute, NPL has been developing and standardising the required metrologically-robust methods for the measurement of graphene and related 2D

materials to enable industry to use these materials and realise novel and improved products across many application areas.

The continuation of the NPL-led standardisation work within [ISO/TC 229](#) (nanotechnologies) will allow the chemical properties of graphene related 2D materials to be determined, as well as the structural properties for different forms of graphene material, such as CVD-grown graphene.

Dr Andrew J Pollard, Science Area Leader at NPL said: “It is exciting to see this new measurement standard now available for the growing graphene industry worldwide. Based on rigorous metrological research, this standard will allow companies to confidently compare technical datasheets for the first time and is the first step towards verified quality control methods.”

Dr Charles Clifford, Senior Research Scientist at NPL said: “It is fantastic to see this international standard published after several years of development. To reach international consensus especially across the 37 member countries of ISO TC229 (nanotechnologies) is a testament both to the global interest in graphene and the importance of international cooperation.”

James Baker, CEO of Graphene@Manchester said: “Standardisation is crucial for the commercialisation of graphene in many different applications such as construction, water filtration, energy storage and aerospace. Through this international measurement standard, companies in the [UK](#) and beyond will be able to accelerate the uptake of this 21st Century material, now entering many significant markets.”

Read the [original article](#) on Metrology and Quality News.