

## **International Standardization on Graphene-based Nanotechnology**

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International standards are more and more recognized as a tool for dissemination and exploitation of research results for developing industrial applications. To be successful in facilitating this transition, the process of standardization needs to be started as early as possible even if fundamental research has not established a satisfactory level of knowledge and industrial fabrication processes are not mature enough for commercialization.

In the area of nanotechnology, international standardization started 10 years ago driven by the International Electrotechnical Commission (IEC) and the International Standardization Organization (ISO) with the establishment of the two technical committees IEC/TC 113 and ISO/TC 229. Currently, over 100 standards are published or under development. They cover a broad range of nanotechnologies topics from nanomaterials to nano-enabled batteries and nano-enabled photovoltaics as well as standards regarding environmental, health and safety aspects and the development of a comprehensive nanotechnology vocabulary.

With the rise of graphene-based technologies, this topic was adopted by the committees IEC/TC 113 and ISO/TC 229 leading to the establishment of currently 8 graphene projects. On the European level, graphene standardization was identified as an important activity within the Graphene Flagship. Here standardization is not only needed from a technical point of view to ensure that material specifications and measurement methods are developed in consensus with the involved stakeholders. It also helps to improve the exchange of information across work packages and supports the development process along the roadmap from research to commercialization.

This workshop will introduce to the international standardization on graphene technologies and present the status reached. This includes the activities within the IEC and ISO nanotechnology committees and the recently established Graphene Flagship Standardization Committee which is now organizing the CENELEC Workshop on Specifications for Graphene Related Materials (WS SGRM). All this activities are well linked together to ensure the establishment of a comprehensive system of standards for graphene-based technologies.

Furthermore, it should become clear how important it is especially for the industry to actively participate in the standardization process and what kind of service IEC and ISO provide to make this investment most efficient for its stakeholders.