



# Graphene and Related 2D Materials

Technical Work Area 41

## Project 2 Chemical composition of graphene flakes: Metal Impurities using inductively coupled plasma mass spectrometry (ICP-MS)

### Objectives

This project aims to:

- Validate methodology for measuring the metal impurities of graphene flakes in a powder form, using inductively coupled plasma-mass spectrometry (ICP-MS).
- Determine the uncertainties associated with the measurement and data analysis.

### Background

Graphene is expected to play an important role in many different applications such as solar cells, biosensors, displays, composites, flexible electronics and energy storage owing to its exceptional properties. One of the many characteristic features of graphene is that it is the first truly two-dimensional material, being only 1 atom thick. Dedicated research into a entirely new family of other 2D materials has indicated that these new materials show exciting properties complementary to those of graphene, revealing potential for numerous industrial applications.

### Standardization Needs

As industry uptake on this material increases, international standardization is critical to enable commercialization. Reliable, accurate and reproducible measurements are important in order to maintain quality, considering that there are multiple production routes and producers of the material.

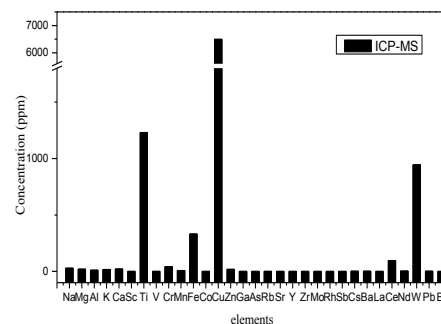
Several standards are under development within ISO TC 229 'Nanotechnologies', jointly with IEC TC 113, that are focused on the measurement of specific properties of graphene produced through different methods. There is currently a need for measurement standards that address the determination of chemical properties including metal impurities.

### Work Programme

The graphene will be sourced by an industrial collaborator.

The species and concentrations of metal impurities in graphene flakes are to be measured reliably and quantitatively.

## Call for Participation



for consideration towards future international standardization.

### Funding

Participants fund their own involvement in the project.

### Project Status

The project is due to start in December 2017 for a duration of 6 months.

The samples will be prepared and despatched to each participating laboratory by the project leader.

### International Participation

Current participation includes volunteers from Australia, Brazil, China, France, Spain, UK and USA. More participants are welcome.

### Deliverables and Dissemination

- Development of experimental methods for the species and concentrations of metal impurities in graphene flakes.
- Publications in peer-reviewed scientific journals.
- VAMAS Technical Report
- This study will be reported to ISO/TC229 and/or IEC/TC113

**To register your interest to participate, please contact:**

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