Versailles Project on Advanced Materials and Standards

Calls for Participation – February 2026

VAMAS

Page	TWA	Project	Project Title
2	0	T6	Life Cycle Assessment
3	2	A49	OrbiSIMS Metrology: Linearity of the Intensity Scale and Implications to Data Processing
4	2	A50	Determination of shell thickness and chemistry of core-shell nanoparticles using X-ray photoelectron (XPS) spectroscopy
5	2	A51	Analysis of the amount of surface functional groups on silica nanoparticles using X-ray photoelectron (XPS) spectroscopy and Secondary Ion Mass Spectrometry (SIMS)
6	34	19	Analysis of total functional group content on aminated silica nanoparticles using quantitative NMR (qNMR)
7	34 P20 & 37 P9		Cross-section preparation of inorganic pigments: enabling sizing, shape and microstructure analysis
8	37	8	Guidelines on FIB Preparation of APT Specimens
9	37	10	A method to evaluate ion-beam alignment for FIB-SEM
10	41 P16 & 43 P6		In-plane thermal diffusivity measurements of graphene and related 2D material films
11	42 P8 & 46 P3		Standardising Lattice Strain Measurements in Semiconductor Substrates using Raman Spectroscopy
12	42	9	Interlaboratory study to measure variability in Coherent Raman Scattering (CRS) microscopy peak position
13	42	10	Wavenumber Validation of Raman spectrometers
14	43	5	Cryogenic Thermal Analysis

Life Cycle Assessment (LCA)

TWA 0

Project T6

Objectives

- Understand the global Life Cycle Assessment (LCA) needs for advanced and emerging materials to support future standardisation initiatives
- Initially assess the global composite industry regarding LCA and facilitate the development of improved regulations and standards

Background

Life cycle assessment (LCA) is a systematic evaluation of environmental impact of a product, process or service throughout its entire life cycle. By examining its entire lifecycle – from raw material extraction to disposal – LCA provides valuable data to inform sustainable decision-making.

Standardization Needs

LCA, a data-intensive methodology, can yield disparate results due to a lack of standardisation. Challenges pertaining to methodological inconsistencies, data quality, transparency, and reproducibility are frequently discussed but remain unaddressed on a global scale.

Deliverables and Dissemination

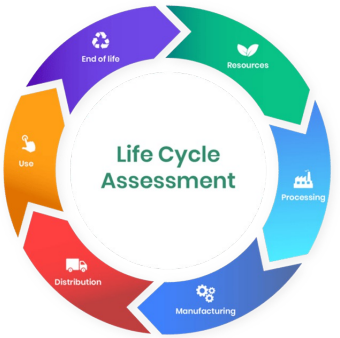
By identifying the most common issues faced by industry, users and research institutes, the aim is to bridge the gaps in current methodologies and facilitate the development of improved regulations and standards.

Work Programme

The initial project is proposed to address the global challenges hindering accurate LCA implementation within the composites industry.

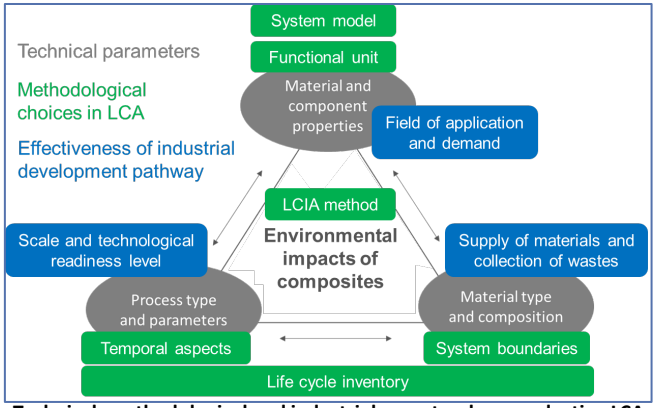
Statistical analysis of the results from participants will be conducted as consistent with ISO/TS 5725.

- Review existing studies on LCA of fiber-reinforced polymer composites
- Undertake a consultation exercise within the global composites community (academia and industry)
- Analyze survey results for a joint publication in a scientific journal
- Outline recommendations for the conduct of LCA in the composites industry



Call for

Expressions of Interest



Technical, methodological and industrial aspects when conducting LCA of composites

How can technical aspects at industrial scale be incorporated in methodological choices in LCA to produce meaningful results guiding the path to sustainable development?

Funding

Participants fund their own involvement in the study. The international collaborative partnerships that VAMAS fosters, pave the way for future standardisation initiatives.

Status

The working group is actively looking for members. We understand that your time is valuable, and we are flexible regarding the level of involvement required.
We are particularly keen to welcome members from North and South America, Asia and Africa to ensure global coverage.

References

- ISO 14040:2006 “Life Cycle Assessment – Principles and framework”
- ISO 14044:2006 “Life Cycle Assessment – Requirements and guidelines”

Register your interest

For more information:
Project Leaders:

Nilmini Dissanayake
University of Cambridge, UK
npd31@cam.ac.uk

Ulrike Kirschnick
Technical University Leoben, Austria
ulrike.Kirschnick@unileoben.ac.at

www.vamas.org

September 2025

VAMAS

Surface Chemical Analysis

Technical Work Area 2

Call for Participation

Project A49

OrbiSIMS Metrology: Linearity of the Intensity Scale and Implications to Data Processing

Objectives

The previous VAMAS TWA 2 A37 project evaluated a comparison metric for Orbitrap Secondary Ion Mass Spectrometry (OrbiSIMS) instruments [1]. Participant data enabled assessment of repeatability, reproducibility and noise characteristics. However, the data was very rich, and further evaluation is anticipated to yield a basis for standardised advanced data analysis corrections of artefacts arising from non-linearities [2]. Project A49 will focus on analysing existing data from A37 and welcomes new contributions from other laboratories not involved in the original study. We will conduct this under TWA 2 stream 4: Data workflow, methods and best practice (DAT).

Background

In OrbiSIMS [1], a quasi-continuous stream of secondary ions is injected into a special ion trap where they revolve around a central spindle shaped electrode and oscillate along it with a frequency inversely proportional to the square root of the mass of the ion. An image charge is created in a pair of outer electrodes and is measured with time using a differential amplifier. The time-domain transient signal is digitised and can be converted to the frequency (and hence mass) domain by a Fourier transform.

Standardization Needs

With a growing global number of OrbiSIMS instruments there is an increased need for reproducible and intercomparable measurements. The methods of this project can be used for internal quality control, and improved reproducibility is directly beneficial for industries that use the technology such as Semiconductors, Pharmaceutics, Printed electronics, Organic electronics, and Energy storage.

Work Programme

For this study, we will assess the linearity of the signal intensity scale. The experiments consist in systematically varying the number of secondary ions sent to the Orbitrap. Preliminary studies found that non-linearity in signal arises from space-charge effects in the trap and is m/z-dependant. These findings have direct implication on applications such as depth profiling and imaging.

Statistical analysis of the results from participants will be conducted as consistent with ISO/TS 11308.

Funding

Participants fund their own involvement in the project.

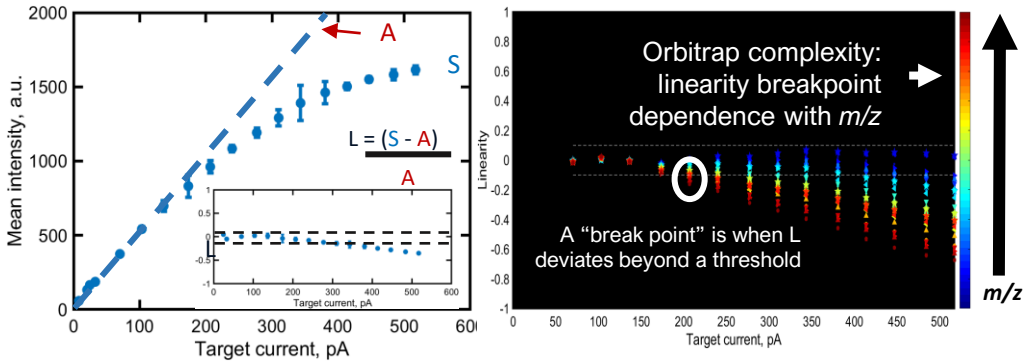


Figure 1: The experiment to measure the linearity the intensity scale requires a systematic variation of the number of secondary ions into the Orbitrap. Linearity (L) is calculated based on the deviation against linear prediction of each *m/z* signal in function of total intensity.

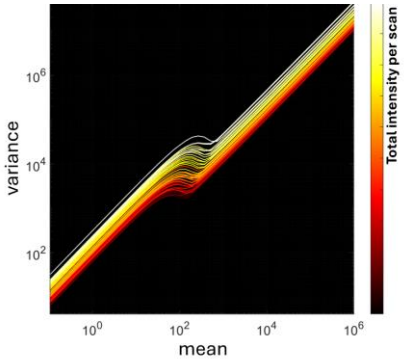


Figure 2: We previously introduced the WSoR model [2] for OrbiSIMS data. A comparison of WSoR models across intensity regimes showed a dependence of the variance overall with the total intensity per scan in the Orbitrap analyser.

Deliverables and Dissemination

- A VAMAS report on the interlaboratory comparison.
- A peer-reviewed article describing the results of the intercomparison study.
- A presentation at a specialists conference/meeting

References

[1] Passarelli *et al. Nat Methods* **2017**, 14(12), 1175-1183. doi: 10.1038/nmeth.4504

[2] Keenan *et al. Nat. Commun.* **2025**, 16(1), 6398.

For more information:

Project Leaders:
Dr Gustavo Trindade
National Physical Laboratory, UK
Gustavo.Trindade@npl.co.uk

TWA 2 Chair and Vice-Chair
Prof. Ian Gilmore
NPL, UK
ian.gilmore@npl.co.uk

Dr. Charles Clifford
NPL, UK
charles.clifford@npl.co.uk

www.vamas.org

January 2026

VAMAS

Surface Chemical Analysis

Technical Work Area 2

Call for Participation

Project A50

Determination of shell thickness and chemistry of core-shell nanoparticles using X-ray photoelectron (XPS) spectroscopy

Objectives

◦ To validate an XPS-based measurement protocol for measuring the shell thickness and chemistry of core-shell nanoparticles.
◦ Support revision and development of ISO/TR 23173 into a full ISO standard.

Background

Core-shell nanoparticles are increasingly used in advanced applications such as drug delivery, diagnostics, catalysis, and energy storage. Their performance and safety are critically influenced by the chemical composition and thickness of their surface coatings. However, reliable and standardised methods for measuring these properties are lacking.

Current guidance, such as ISO/TR 23173:2021, are only informative and lack normative protocols. This gap hinders industrial development

A SMURFnano project is addressing this need by developing validated, traceable XPS-based for measuring shell thickness and composition on real-world core-shell nanoparticles.

The international interlaboratory comparison (ILC) of this call will be used to validate the performance of developed protocols and enable reproducibility assessment and uncertainty quantification.

The results will support the revision of ISO/TR 23173 and contribute to the development of a full ISO standard under ISO/TC 201.

This work also aligns with a proposed pilot studies under BIPM CCQM SAWG, helping to establish reference materials and methods for nanoparticle surface analysis.

Standardization Needs

The project will help validate a protocol for the determination of shell thickness and chemistry of core/shell nanoparticles. This protocol will be used to revise ISO/TR 23173:2021 under ISO/TC 201 as a full international standard.

Work Programme

Selection and preparation of core-shell nanoparticle samples for the ILC is ongoing.

Development and refinement of an XPS protocol is also underway.

Four samples are planned to be sent to participants, likely consisting of two to three thicknesses of gold-silica core shell nanoparticles along with one Lanthanide nanoparticle sample. The samples will be sent along with a protocol and a reporting sheet.

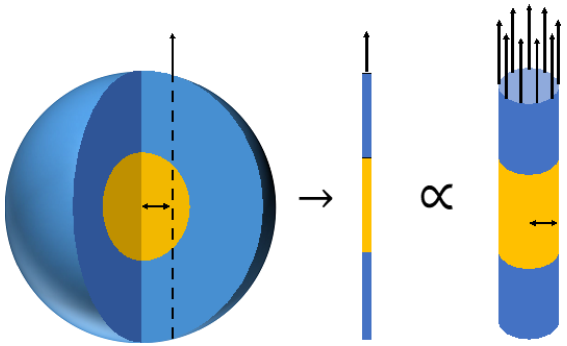


Figure: Iillustration of how the geometry of a core–shell nanoparticle influences XPS signal interpretation.

The results of ILC will be analysed and circulated to participants before being written up as a peer-reviewed publication. The reproducibility and uncertainty of the results will be analysed.

Deliverables and Dissemination

The interlaboratory study will be delivered. If successful, this will lead to a peer-reviewed publication. Presentations at national and international conferences based on the ILC results are also expected.

Funding

Participants fund their own involvement in the project. Anticipated work is ≈ 3 days.

Status

The project will launch in Q4 2025. Experts are invited to participate.

For more information:

Project Leaders:
Dr. David Cant
National Physical Laboratory (NPL) UK
david.cant@npl.co.uk

TWA 2 Chair and Vice-Chair
Prof. Ian Gilmore
NPL, UK
ian.gilmore@npl.co.uk

Dr. Charles Clifford
NPL, UK
charles.clifford@npl.co.uk

www.vamas.org

December 2025

VAMAS

Surface Chemical Analysis

Technical Work Area 2

Call for Participation

Project A51

Analysis of the amount of surface functional groups on silica nanoparticles using X-ray photoelectron (XPS) spectroscopy and Secondary Ion Mass Spectrometry (SIMS).

Objectives

- Validate XPS and SIMS-based methods for quantifying surface functional groups on nanoparticles.
- Support the development of standardised protocols for surface chemical analysis.
- Contribute to international standardisation efforts under ISO/TC 201, ISO/ TC 229 and BIPM CCQM SAWG.

Background

Functional groups on nanoparticle surfaces govern interactions with biological systems, catalytic activity, and colloidal stability. While standards exist for particle size and morphology, and despite its importance, there is currently no normative international standard for measuring surface chemistry, particularly the measurands of coating thickness and functional group density.

The European metrology project SMURFnano is helping to address this gap by developing and testing XPS and SIMS-based protocols for functional group quantification. These methods will be evaluated through this international interlaboratory comparison (ILC). enabling

The international interlaboratory comparison (ILC) of this call will be used to assess the reproducibility, uncertainty, and robustness of the developed protocols

This work builds on previous EMPIR and VAMAS activities and aligns with emerging needs in regulatory science, nanomedicine, and materials characterisation.

Standardization Needs

The project will help establish validated protocols for quantifying surface functional groups using XPS and SIMS, and provide input to ISO TC229 nanotechnologies for preliminary work item (PWI) 19257 - Characterization and quantification of functional groups and coatings on nano-objects-

Results will also be presented to ISO/TC 201 for the development of a new international standard(s) or revision of existing guidance.

The ILC will run in parallel to a) BIPM CCQM SAWG pilot studies on nanoparticle surface analysis and b) Project 19 of TWA34 using the same samples with analysis using quantitative NMR (qNMR).

Work Programme

- Obtain nanoparticle samples with known surface functionalities (*e.g.*, amine on silica nanoparticles).
- Development and refinement of XPS and SIMS protocols for quantification.
- Distribution of samples, protocols and additional reference samples to participating labs along with a reporting spreadsheet.
- Performance of ILC by participants.
- Statistical analysis of reproducibility and uncertainty.
- Dissemination of results through peer-reviewed publications and conference presentations.

Deliverables and Dissemination

The interlaboratory study will be delivered. If successful, this will lead to a peer-reviewed publication. Presentations at national and international conferences based on the ILC results are also expected.

Funding

Participants fund their own involvement in the project. Anticipated work is ≈ 3 days.

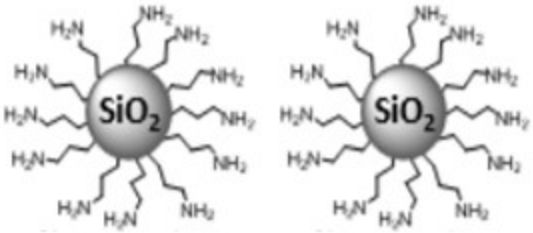


Figure: Schematic of amine functionalized silica nanoparticles

Status

The project will launch in Q4 2025. Experts are invited to participate.

For more information:

Project Leaders:
Dr Jörg Radnik
Bundesanstalt für Materialforschung und –prüfung (BAM), Germany
joerg.radnik@bam.de

Dr Peter Sjövall (for SIMS)
RISE Research Institutes of Sweden
peter.sjovall@ri.se

TWA 2 Chair and Vice-Chair
Prof. Ian Gilmore, NPL, UK
ian.gilmore@npl.co.uk

Dr. Charles Clifford, NPL, UK
charles.clifford@npl.co.uk

www.vamas.org

December 2025

NANOPARTICLE POPULATIONS

Technical Work Area 34

VAMAS

Project 19

Analysis of total functional group content on aminated silica nanoparticles using quantitative NMR (qNMR)

Objectives

This ILC will provide data to assess a protocol for quantitative NMR (qNMR) data acquisition and quantification analysis of amine functional groups on silica nanoparticles (NPs).

ILC results will inform international standardisation efforts aimed at methods for quantifying surface chemistry under ISO/TC 229, ISO/TC201 and BIPM CCQM OAWG/SAWG, specifically validation of a qNMR protocol for surface chemical analysis under ISO TC229 PWI 19257.

Background

Functional groups on NP surfaces govern interactions with biological systems, catalytic activity, and colloidal stability. While ISO standards exist for specification of particle size and morphology, there is currently no normative international standard for assessing the surface chemistry of such NPs, particularly for quantifying the amount of either coating ligands or functional groups.

This project will test a protocol for quantification of total and surface localized and accessible surface functional groups on NPs as informed by previous bilateral comparisons of qNMR and XPS methods and the results of a European metrology SMURFnano project.

The proposed protocol involves hydrolysis followed by quantitative solution NMR assessment of functional group concentration(s). This method is anticipated to provide a traceable measurement of total functional group content in a sample.

Data collected by participants will be used to determine reproducibility and uncertainty statistics, as well as information on the clarity of the protocol document and ease of implementation. These goals align with emerging needs in regulation, nanomedicine, and materials characterisation. A set of silica NP test materials were selected for this study based on their industrial importance.

Standardization Needs

This ILC will support ISO TC/229 PWI 19257 (Characterization and quantification of functional groups and coatings on nano-objects) in developing and validating protocols to assess both total and surface/near surface functional group content on NPs. A sufficiently successful protocol will be contributed to a Technical Specification anticipated to include multiple methods to quantify total and surface functional groups. The ILC will run in parallel with a BIPM CCQM OAWG pilot study on nanoparticle surface analysis.

Call for Participation

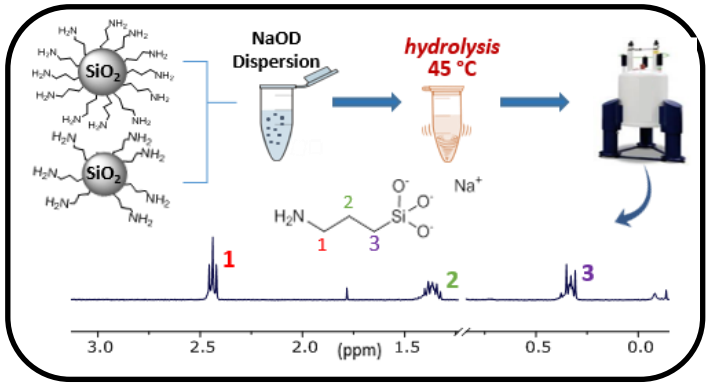


Figure.
Hydrolysis procedure and qNMR spectrum of the three aminopropyl methylene residues of aminosilane released from silica NPs

Work Programme

Organizers will provide:

- pre-bottled aminated silica NPs (nominal sizes of 50 nm, 80 nm, 100 nm) characterized for stability
- qNMR experimental method and analysis protocol
- data sheet for recording results

Participants will:

- Provide input on the method and text of the qNMR protocol
- Conduct measurements and report results, including statistical analysis of local reproducibility and uncertainty

Global analysis of all results will be conducted by the organizers.

Deliverables and Dissemination

The interlaboratory study will be completed within one year and is expected to lead to a publication. The results will provide pre-normative data for an ISO technical specification.

The ILC results will be presented at conferences and SMURFnano meetings.

Funding

Participants fund their own involvement in the project. The anticipated time commitment of participation is ≈ 5 days.

Status

Participants are being recruited. Estimated ILC start date is January 2026

For more information:

Project Leaders:
Ute Resch-Genger
BAM, Germany
ute.resch@bam.de

Klas Meyer
BAM, Germany
klas.meyer@bam.de

TWA 34 Chair
Jeffrey A. Fagan
jeffrey.fagan@nist.gov

www.vamas.org

November 2025

VAMAS

Nanoparticle Populations TWA 34
Quantitative Microstructural Analysis TWA 37

Joint Project TWA 34/P20 and TWA 37/P9

Cross-section preparation of inorganic pigments: enabling sizing, shape and microstructure analysis

Objectives

This project assesses the reproducibility and robustness of a cross-section sample preparation method for irregularly shaped inorganic particles with a broad size distributions. It aims to complement the sample preparation procedures given in ISO 19749 for measuring the particle size and shape distribution by adding normative specifications for sample preparation.

Background

The European Commission's recommend-dation on the definition of nanomaterials has driven the development of reliable methods for measuring the size and shape of (nano-) particulate materials. Part of this effort resulted in ISO 19749. However, the crucial step of sample preparation is excluded from the normative sections and moved to informative annexes of this and other standards due to its complexity and variability. Nevertheless, the need for standardized sample preparation methods remains inherent and essential.

Relevant Standards

ISO 19749: Nanotechnologies — Measurements of particle size and shape distributions by scanning electron microscopy

Funding

Participants fund their own involvement in the project.

Standardization needs

Normative specification for sample preparation including harmonized protocols for the following:

- representative sampling
- embedding and mounting
- surface quality requirements
- imaging conditions
- documentation and quality control

Work Program

To address multiple sources of variation, the ILC includes two parts: i) preparation and ii) measurement with evaluation. It is open to labs for one or both stages.

1. Preparatory steps

- Sample preparation and image analysis protocol review
- Analysis of supplied sample images

2. ILC

i) Sample preparation,
ii) SEM measurement and data evaluation

3. Statistical evaluation

- Preparation of deliverables and dissemination

Comment on Data management

- All data will be shared on a data repository

Call for Participation

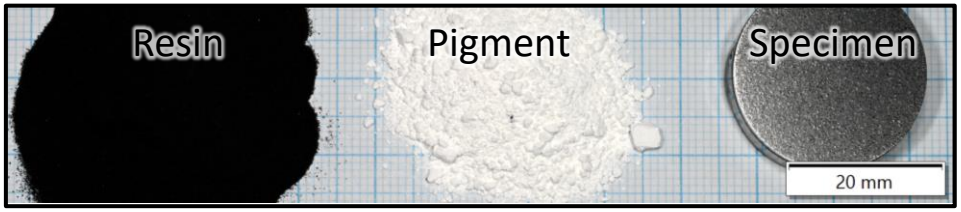


Figure 1: Preparation – Starting materials and finished macroscopic sample

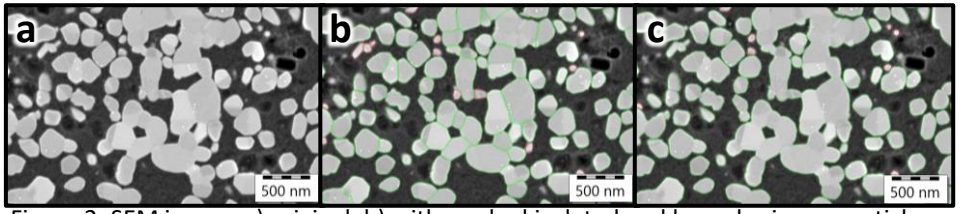


Figure 2: SEM image: a) original; b) with marked isolated and bound primary particles; c) with marked isolated primary particles and aggregates; red particles are nanoparticles

Deliverables and Dissemination

- Comprehensive report
- Draft normative specification
- Peer-reviewed publication

Required Methods

Cross-Section Preparation

- Dispersion, hot-mounting, polishing

SEM Measurement

- Image acquisition and evaluation

Timeline

The project is due to start in February 2026 and finish by February 2028.

References

Theissmann et al., 2014, doi:10.3762/bjnano.5.192
Theissmann et al., 2024, doi:10.3762/bjnano.15.29

For information please contact:

Project Leaders
Dr. Ralf Theissmann
KRONOS International, Inc
ralf.theissman@kronosww.com

TWA Chair (TWA 34)
Dr. Jeffrey Fagan
National Institute of Standards
Materials Measurement Lab.
jeffrey.fagan@nist.gov

TWA Chair (TWA 37)
Dr. Dan Hodoroaba
Federal Institute for Materials
Research and Testing
dan.hodoroaba@bam.de

www.vamas.org
November 2025

VAMAS

Quantitative Microstructural Analysis

TWA 37

Project 8

Guidelines on FIB Preparation of APT Specimens

Objectives

The guidelines (link to ISO/TC202) are for FIB (focused ion beam) preparation of APT (atom probe tomography) specimens, which need to be in nanometer sizes (10 to 100 nm level) and free of ion beam damage. Thus, the APT specimens can be detected with atom-resolution regarding their micro-structure and composition. Challenges and drawbacks must be well-known to avoid ion-beam damage and prepare extremely thin sample, by FIB.

Background

A project with emphasize on advanced FIB technology and professional APT specimen preparation is needed for standardization, since the recent FIB technological developments can provide perfect solution for the challenging task in the past. The specimen preparation currently relies on the standards from transmission electron microscope (TEM) field, which are lacking of detailed professional operations for APT specimen.

Relevant Standards

i) ISO/CD 16887: standardising FIB sample preparation, with some content applicable to FIB's TEM sample preparation.
ii) ASTM E2014: related content concerning ion beam sample processing and subsequent electron microscope microanalysis.

Standardization needs

This guidance is needed by following fields:

- Provide harmonised protocols, with typical samples such as Au/Si APT
- Support ISO TC201/SC1 activities on atom probe terminology and methods
- Contribute to pre-normative work by offering validated reference samples and reproducibility data by means of interlaboratory comparisons
- Relevant standards for related techniques include ISO/CD 16887 (FIB sample preparation for TEM) and ASTM E2014 (FIB techniques)

Work Programme

- Year 1 (2025–2026): Preparation of Au/Si reference specimens; development of FIB protocols; pilot studies in lead laboratories
- Year 2 (2026–2027): Interlaboratory comparison (ILC) across multiple laboratories; collection of APT datasets by project lead
- Year 3 (2027–2028): Statistical evaluation of reproducibility; preparation of report documents

Call for Participation

Fig.1 APT preparation by FIB

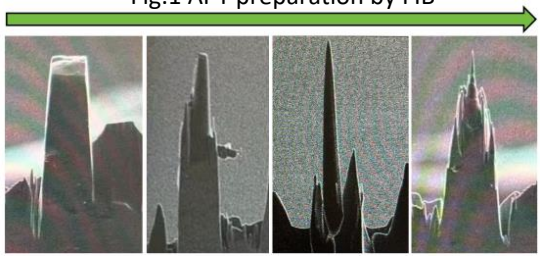


Fig.2 APT preparation process *via* FIB

Deliverables and Dissemination

The expected products include:

- One chapter book on FIB sample preparation for APT
- Two workshops on FIB sample preparation APT (with typical sample Au-coated Si), and
- perform TEM, SEM, EDS and EELS measurements
- Two presentations on FIB preparation of APT sample
- One research /test procedure
- One technical report and a draft standardisation

Funding

Participants fund their own involvement in the project.

Status

The project is due to start in October 2025 and finish by December 2028.

For more information:

Project Leaders
Dr. Yu Deng
Nanjing University
dengyu@nju.edu.cn
Dr. Yi Qiao
University of Science and Technology Beijing
qiaoyi@ustb.edu.cn
Dr. Xianglin Zhong
University of Manchester
xl.zhong@manchester.ac.uk
TWA Chair
Dr. Dan Hodoroaba
Federal Institute for Materials Research and Testing
dan.hodoroaba@bam.de

www.vamas.org
October 2025

VAMAS

Quantitative Microstructural Analysis

Technical Work Area 37

Project 10

A method to evaluate ion-beam alignment for FIB-SEM

Objectives

The purpose of this Interlaboratory Comparison (ILC) is to develop a simple method that allows users to verify whether a focused ion beam (FIB) is in a correctly aligned condition suitable for FIB-SEM processing. This is crucial, as FIB milling is an irreversible destructive process, and once processing begins the sample cannot be restored to its original state. The need for a verification method is imperative for applications requiring long processing times, such as 3D observation, measurement, and analysis.

Background

FIB-SEM supports a wide range of research and development across various fields such as material science, semiconductors, and biology. This is possible through its functions in TEM and SEM sample preparation, three-dimensional observation, measurement, and analysis.

However, those who have experience with electron microscope technologies like FIB-SEM, TEM, or SEM may have encountered the challenges associated with adjustment. Especially for users with limited experience, it can be difficult to determine whether the equipment is correctly adjusted. Providing all users with uniform methods to evaluate the adjustment status is essential for the advancement of FIB-SEM technology.

Standardization Needs

In 2024, the Japanese Industrial Standards Committee (JISC) conducted a priority survey on standardization needs for FIB-SEM systems. The results revealed a strong demand for standardization of FIB-SEM equipment and its specifications, among which one of the topics raised was: "*Users want a simple method to check the state of the ion-beam alignment before commencing processing*."

This need serves not only as an indicator of operational proficiency for users with limited experience, but also as a means for users to verify the results of automatic alignment functions in their FIB-SEM instruments. Moreover, in the ion-column of a FIB-SEM, components such as apertures and blankers are subject to wear from ion-beam milling effects. Given that the instrument condition can change daily, it is considered beneficial to employ this verification method to monitor the evolving system status on a regular basis.

Work Programme

1. **Mar 2026:** Specimens will be delivered to participants along with the protocols.
2. **April/May 2026:** FIB processing on Si and observation will be done by the participants in accordance with the protocols provided.
3. **June 2026:** Data submission and analysis.
4. **Apr 2027:** Report based on the results is prepared and delivered to participants.

Statistical analysis of the results from participants will be conducted in line with ISO/TS 11308.

Deliverables and Dissemination

- Report based on this the results will be distributed to all attendees.
- A method to evaluate ion-beam alignment for FIB-SEM will be established by the ISO in the TC 202/SC4.

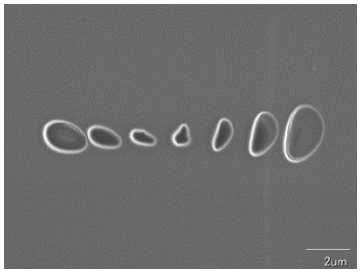
Funding

Participants fund their own involvement in the project.

Project Status

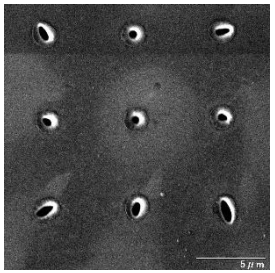
Project initiation is in February 2026 for a duration of up to 12 months.

Call for Participation



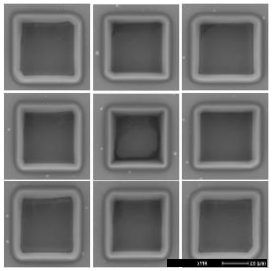
(i) Focus array

Spot milling after changing the focus. Users can recognize the status of adjustment for focus, objective aperture and astigmatism by analyzing this focus array pattern.



ii) Aperture spot matrix

Spot milling after changing aperture alignment. Users can recognize the adjustment status of their instrument as a 2-dimensional distribution.



iii) Astigmatism matrix box

Box milling after changing astigmatism. Users can recognize their adjustment status as a 2-dimensional distribution.

References

ISO/FDIS 17297 FIB Vocabulary
ISO/TC202/SC1 - in progress

ISO/CD 16887 Guidelines for TEM specimen preparation using FIB
ISO/TC202/SC3 - in progress

For more information:
Project Leader:
Mr. Takeshi Nokuo
JEOL, Japan
Email: nokuo@jeol.co.jp

TWA 37 Chair
Dr. Vasile-Dan Hodoroaba
Federal Institute for Materials Research and Testing (BAM), Germany
dan.hodoroaba@bam.de

www.vamas.org

January 2026

VAMAS

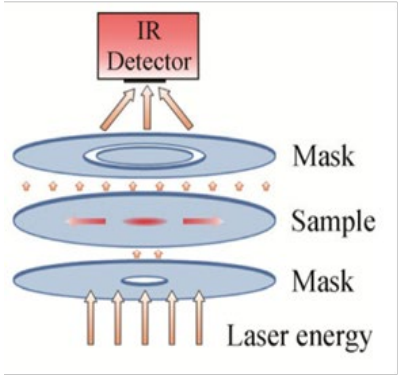
Graphene and elated 2D materials Thermal properties

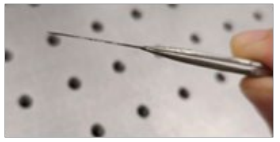
TWA 41
TWA 43

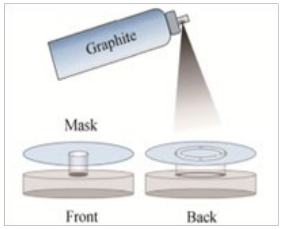
Call for Participation

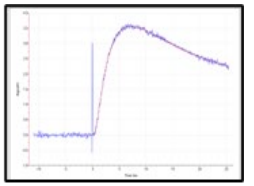
Joint Project: Technical Work Areas 41/16 and 43/6

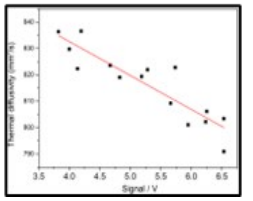
In-plane thermal diffusivity measurements of graphene and related 2D material films











Objectives

This project aims to test a protocol for flash method measurement of the in-plane thermal diffusivity of graphene and related 2D materials (GR2M) films. Results will be used to validate interlaboratory reproducibility and to determine uncertainties associated with the measurement and data analysis.

Background

Due to their ultra-high thermal conductivity, flexibility, light weight, and low-cost, GR2M films are under development or applied worldwide for thermal management in various applications including micro-electronics, integrated circuits, communications, and new energy vehicles. The primary material property for performance evaluation towards such applications is the in-plane thermal diffusivity.

The flash method is considered to be effective for thermal diffusivity measurements of GR2M films, and, as such, is a widespread technique. However, no validated method is available as an international standard, and the degree of interlaboratory variation using a single measurement protocol, arising from sample preparation, test conditions and/or instrument calibration, has not been evaluated.

Standardization Needs

There are no internationally recognized standards at present for in-plane thermal diffusivity measurement of GR2M films using the flash method. Accurate and reproducible measurement methods are important to maintain quality in manufacturing and promote international commerce as there are multiple production routes and suppliers of GR2M materials. Data from this effort will be used to inform potential international standardization.

Work Programme

Participants are expected to conduct thermal diffusivity measurements of GR2M films by the flash method using a provided data analysis method. Flexible GR2M films will be centrally prepared and screened for flatness before shipping to participants. Several samples may be provided. Measurements are to be based on the protocol, and both analysed and raw data will be collected.

Deliverables and Dissemination

Results will be included in a VAMAS technical report and in an anticipated scientific journal publication. They may also inform international standardization efforts in ISO TC 229.

International Participation

Current participation includes institutes from Australia, Asia and Europe. More participants are welcome.

Funding

Participants fund their own involvement in the project.

Project Status

The project is seeking additional participants. Completion is expected in 2026.

For more information:

Project leader
Dr. Shuo Li
National Institute of Metrology, China
lishou@nim.ac.cn

TWA 41 Co-Chairs
Dr. Lingling Ren
National Institute of Metrology, China
renll@nim.ac.cn

Dr. Andrew Pollard
National Physical Laboratory, UK
andrew.pollard@npl.co.uk

TWA 43 Chair
Sam Gnaniah
National Physical Laboratory, UK
sam.gnaniah@npl.co.uk

www.vamas.org

January 2026

VAMAS

Raman Spectroscopy Technical Work Area 42

Semiconductors Technical Work Area 46

Call for Participation

Joint Project 42-8 and 46-3

Standardising Lattice Strain Measurements in Semiconductor Substrates using Raman Spectroscopy

Objectives

To develop and validate standardized methodologies for strain measurement in epitaxially grown silicon–germanium (SiGe) materials using confocal Raman spectroscopy.

Background

With continued device scaling and rising performance demands, accurate characterization of lattice strain is increasingly important for materials development and process control. Strain affects carrier mobility, band structure, and defect formation—key factors in semiconductor performance.

Raman spectroscopy offers a non-destructive, high-resolution method for strain analysis, but differences in instrumentation, calibration, and data interpretation can lead to inconsistent results. This initiative supports the harmonization of Raman-based strain measurements in epitaxial SiGe, enabling traceable and comparable data across laboratories worldwide

Standardization Needs

Currently, no international standard exists for quantifying strain in SiGe using Raman spectroscopy.

The H2020 "CHALLENGES“ project demonstrated the method’s precision and robustness across various Ge concentrations and instrument types. In response to a formal request from ISO/TC 201, PTB is coordinating this VAMAS interlaboratory comparison to support global standardization of strain and stress measurement in semiconductors.

Work Programme

Each participant will receive two representative samples consisting of epitaxially grown SiGe layers on silicon substrates. The two samples share an identical layout but differ in their germanium content, resulting in distinct strain levels. These strain states are verified using complementary techniques such as XRD, XPS, or XRF.

A measurement protocol, jointly reviewed and approved by national metrology institutes, will guide all procedures. It covers measurement conditions, sample handling, and data reporting to ensure consistency and comparability of results across laboratories, regardless of instrument type or manufacturer.

Figure: Illustration of phonon excitation in strained SiGe and Si substrates, along with Raman spectral measurements showing the difference in Raman responses between Si and SiGe.

Deliverables and Dissemination

The primary outcome of the study will be a validated measurement protocol for strain analysis in epitaxial SiGe using Raman spectroscopy. The findings will be summarized in a joint scientific publication and shared with the broader metrology and semiconductor communities.

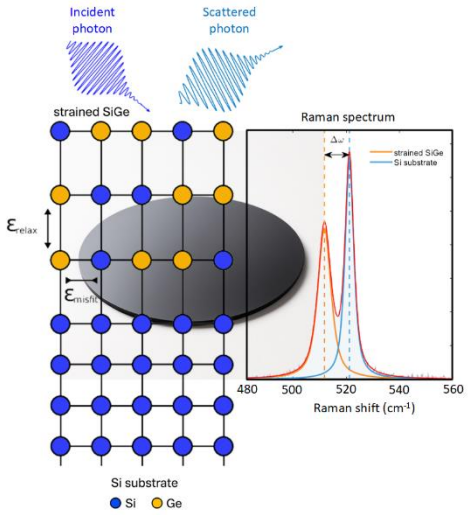
Based on the results, a proposal for an international standard (ISO work item) will be initiated through ISO/TC 201 to support global harmonization of strain measurement procedures in semiconductor materials.

Funding

This study receives no external funding; all participants contribute on a voluntary basis, and the samples are provided free of charge for measurement purposes.

Status

Samples have been dispatched to registered laboratories. A draft measurement protocol has been developed and is currently under review by national metrology institutes. Measurements will begin once the protocol has been approved.



For more information:

Project Leaders:
Dr. Rainer Stosch , PTB/Germany
rainer.stosch@ptb.de

Stefan Wundrack, PTB/Germany
stefan.wundrack@ptb.de

TWA 42 Chair
Dr. Erlon Henrique Martins Ferreira
ehferreira@inmetro.gov.br

TWA 46 Chair
Dr. Fernando Castro
fernando.castro@npl.co.uk

www.vamas.org

2025-11-10

Raman Spectroscopy & Microscopy

Technical Work Area 42

VAMAS

Project 09

Interlaboratory study to measure variability in Coherent Raman Scattering (CRS) microscopy peak position

Objectives

This project aims to measure the variability in peak position values for coherent Raman scattering (CRS) microscopy methods. Candidate sample materials for use as reference standards will be measured to assess within and across instrument variability. These polymer samples are suitable for the most widely used modalities of CRS microscopy: coherent anti Stokes Raman scattering (CARS) and stimulated Raman scattering (SRS).

Background

CRS microscopy is an emerging technique permitting rapid imaging with Raman contrast. It is extensively used in both biological and materials research and has potential clinical applications. Successful translation and commercialisation of the technique demands standards to enable harmonised data acquisition and comparison of data acquired on different instruments. Currently CRS instruments range from home-built to completely commercial devices and comprise a wide range of hardware.

Standardization Needs

There are currently no standards for coherent Raman scattering microscopy. The variability in spectral resolution stemming from differences in instrument responses and data analysis impacts the variability in peak positions. Reference materials with well-known Raman peaks are needed to calibrate the instrument response function. While the ASTM E1840[1] standard proposes a list of samples for spontaneous Raman spectroscopy, these samples are not readily suited for microscopy, for which additional optical properties are critical.

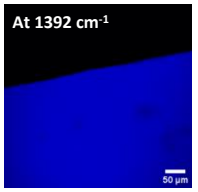
Work Programme

- Participants will receive candidate polymer reference samples and collect results according to provided protocol.
- Statistical analysis of the results from participants will be conducted by NPL and the variability in the peak position for the materials provided will be determined.

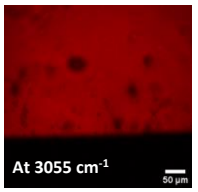
Deliverables and Dissemination

- A peer-reviewed article that discusses the results from the study, including all participants as co-authors.
- Data collected will be used to inform selection of reference materials and validation of the provided procedure for CRS microscopy. Samples are anticipated to cover the ranges of 500 cm^{-1} to 1800 cm^{-1} and 2700 cm^{-1} to 3300 cm^{-1}.

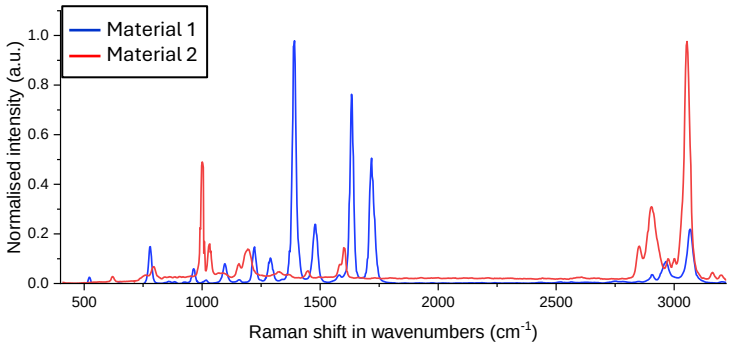
Call for Participation



Sample Material 1



Sample Material 2



Stimulated Raman scattering spectra of sample materials

Funding

Participants fund their own participation. Each participant may need up to 5 days effort to complete the exercise.

Status

The project is due to start in December 2025. Participants are requested to send the data by the end of May 2026. We anticipate the project will finish by end of December 2026.

References

[1]ASTM International. "ASTM E1840-96 Standard Guide for Raman Shift Standards for Spectrometer Calibration". West Conshohocken, Pennsylvania: ASTM International, 2014.

Link to register

For more information:

Project Leaders:
Dr. Dimitrios Tsikritsis
NPL, UK
dimitrios.tsikritsis@npl.co.uk
Dr. Siddarth Shivkumar
NPL, UK
siddarth.shivkumar@npl.co.uk
Dr. Natalie Belsey
NPL, UK
natalie.belsey@npl.co.uk

TWA 42 Chair
Erlon H Martins Ferreira
Inmetro, Brazil
ehferreira@inmetro.gov.br

www.vamas.org

December 2025

VAMAS

Raman Spectroscopy and Microscopy

Technical Work Area 42

Call for Participation

Project 10

Wavenumber Validation of Raman spectrometers

Objectives

- Develop a simple protocol for Raman spectrometer validation that can be performed by beginners.
- Ensure that comparable results can be obtained after calibration.
- Define the desired quality materials to achieve comparable results.

Background

Raman spectroscopy has been widely used across various research and industrial fields. Depending on the users' objectives, the capabilities of Raman spectrometers and the measurement conditions can vary significantly. However, there are currently no standardized calibration and validation methods, which leads to results that are difficult to compare across different systems.

Standardization Needs

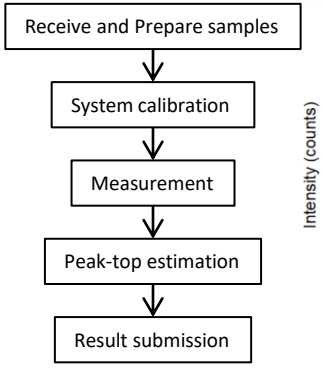
Users of Raman spectrometers often calibrate their systems in their own ways, and some users are not even aware that calibration is necessary. As a result, it is well known that results obtained from different systems and operators are often not comparable. To improve this situation, it is important to raise awareness about the need to calibrate and validate systems in order to obtain consistent results across different instruments, measurement conditions, and users. For this purpose, documentary standards with simple protocols, along with information on suitable validation materials, are needed.

Work Programme

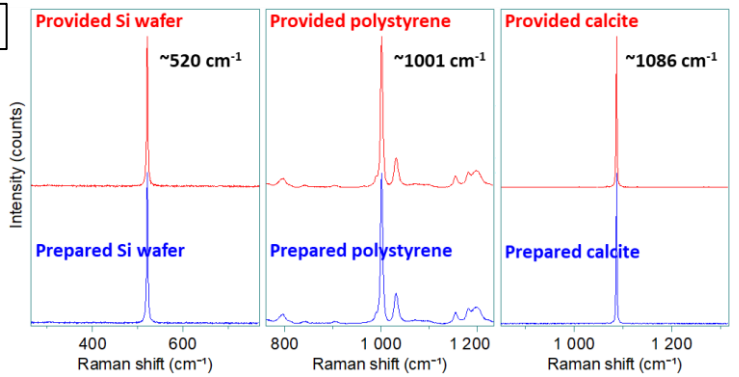
The project leader prepares and provides a set of samples (Si wafer, polystyrene, and calcite) to the participants. Each participant is also required to prepare an additional set of samples that meet the criteria described in the protocol. After calibrating their systems using their own methods, participants measure both sets of samples (the provided set and their own prepared set) according to the protocol. They then complete a reporting sheet detailing the measurement conditions and results, and submit it to the project leader along with the spectral data saved as text files. The project leader analyzes the submitted data.

Deliverables and Dissemination

The results of the interlaboratory study will be published in a peer-reviewed scientific journal, with participants acknowledged as co-authors if they contribute to data analysis and manuscript writing. These results will also be used to refine the protocol, which will be proposed as a documentary standard within ISO TC201/WG5.



Procedure of ILC



Raman spectra examples of Si wafer, polystyrene, and calcite

International participants

Current participants represent Brazil, China, Germany, Italy, Japan, Korea, Spain and UK.

Funding

Participants fund their own involvement in the project. A set of samples (Si wafer, polystyrene, and calcite) will be provided, and participants are required to prepare an additional set according to the protocol. This preparation involves approximately one day of work even under several measurement conditions.

Status

The project is expected to be completed in 12 months after despatch samples.

For more information:

Project Leader

Dr. Nobuyasu Itoh

NMIJ/AIST, Japan

nobuyasu-itoh@aist.go.jp

TWA 42 Chair

Dr. Erlon Henrique Martins Ferreira

Inmetro, Brazil

ehferreira@inmetro.gov.br

Registration link

https://forms.office.com/r/jhZQk90ZCH

www.vamas.org

October 2025

VAMAS

Thermal Properties

Technical Work Area 43

Project 5

Cryogenic Thermal Analysis

Objectives

- Identify active facilities for thermal analysis of solids at cryogenic temperatures from 300 K down to 4 K
- Identify strengths and constraints of the available methods/instruments (uncertainty, sample throughput rate, sample dimensions etc.)
- Exchange knowledge and create connections within the community

Background

Cryogenic thermal analysis is receiving rising interest due to the increasing application of cryogenics in the energy sector (High-temperature superconductors, Liquid hydrogen applications). However, data on material properties and intercomparability of methods at deep cryogenic temperatures are scarce, especially for advanced materials. This deficiency hinders implementation and optimization of novel materials into applications.

- This call seeks to identify organizations interested in cryogenic material property data and their measurement capabilities.
- A second goal is to identify current (in use) calibrants, reference materials and methods for reducing uncertainty and improving measurement intercomparabilty.

Measurands

- Thermal expansion
- Thermal conductivity
- Specific heat
- Thermal diffusivity

Work Programme

Participants must be able to perform one or multiple of the above measurements to temperatures as low as 4 K. A range of various methods and instruments will be involved.

Test materials will be chosen based on their thermophysical properties and availability of reference data. They will be provided in the required geometry. As the measurement uncertainty in thermal analysis is usually linked to the material under investigation, the programme will involve the study of up to two materials per measurement type.

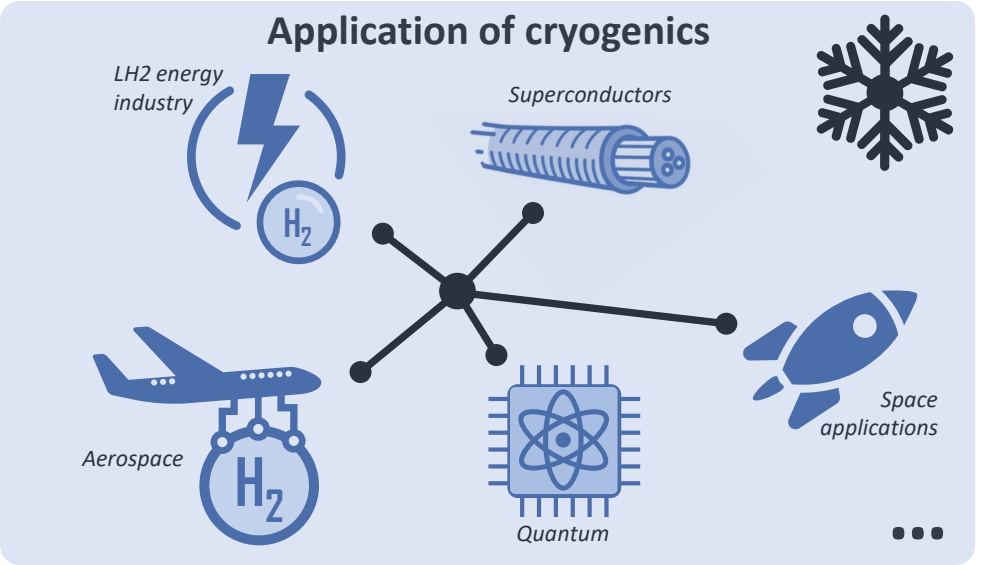
Deliverables and Dissemination

The data from the study will be used to develop best practice guides for the four measurands.

The international collaborative partnerships that VAMAS fosters, paves the way to enable future standardisation initiatives.

Call for

Expressions of Interest



Funding

Participants fund their own involvement in the study.

International Participation

Expressions of Interest are sought for international participation. We are aiming for global representation.

Register your interest
to join the working group

For more information:

Project Leader
Óscar Sacristán de Frutos
European Organization for Nuclear Research (CERN), CH
oscar.sacristan@cern.ch

TWA 43 Chair
Sam Gnaniah
National Physical Laboratory (NPL)
sam.gnaniah@npl.co.uk

www.vamas.org
November 2025