# CCQM Nano and Microplastics Measurements and Standards Task Group:

# Final report and recommendations for CCQM

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## Introduction

The goal of the CCQM Task Group on Nano- and Microplastics Measurements and Standards (CCQM-TG-NMMS) is to understand and document the evolving metrological needs for micro- and nanoplastics characterisation in the environment, food, health and consumer goods, and thereby to support the strategic plans of technical committees (Consultative Committees, CCs) operating within the BIPM system.

Within CCQM, the working groups (WGs) focus on organizing programmes, interlaboratory comparisons and evaluating emerging areas covered by CCQM-TG-NMMS and there is a recognised need for stakeholder feedback in developing such programmes. This was covered by the CCQM-TG-NMMS in its stakeholder workshop held in February 2025 and reported to the CCQM Plenary in April 2025.

The CCQM-TG-NMMS was granted a second extension by the CCQM to define, scope, and prepare a CCQM pilot study on nano- and microplastics and to meet its terms of reference for the year, as follows:

- Develop a plan for a pilot study on nano- and microplastics:
    - Summarise the input from CCQM TG members and broader CCQM membership regarding NMIs interest and capability for participation in pilot study on nano- and microplastics measurements
    - Determine parties and models for coordination of a pilot study on nano- and microplastics effectively operating within the existing CCQM WGs structure
    - Based on feedback from the workshop in February 2025, identify measurands to be included in the pilot study
    - Liaise with all CCQM WGs, other CCs on activities relevant to measurands considered for nano- and microplastics
- Continue liaison with expert practitioners, researchers, regulators and the documentary standards community to further assess priority needs in relation to the metrology community in this rapidly emerging field
- Liaise with all CCQM WGs, other CCs on activities relevant to nano- and microplastics to both inform members of stakeholder needs and share information on related programs and development work within the metrology community
- Present and provide a written report to the April 2026 CCQM plenary on the status of the task group’s work for feedback and comment

# CCQM-TG-NMMS activities 2025-2026

During the year since April 2025, the CCQM-TG-NMMS has met virtually 6 times.

## Pilot study

During this time, the CCQM-TG-NMMS progressed from exploratory discussions to a realistic proposal for a CCQM pilot study on micro- and nanoplastics, which will be presented at the CCQM meeting in April 2026.

Input from CCQM TG members and broader CCQM membership regarding NMIs interest and capability for participation in pilot study of nano- and microplastics has been sought through various forums (CCQM WG and Plenary, Asia-Pacific Metrology Programme), through an online survey. Some of the outcomes from from this survey are displayed in Figure 1 and represent the input from 18 NMIs and DIs.

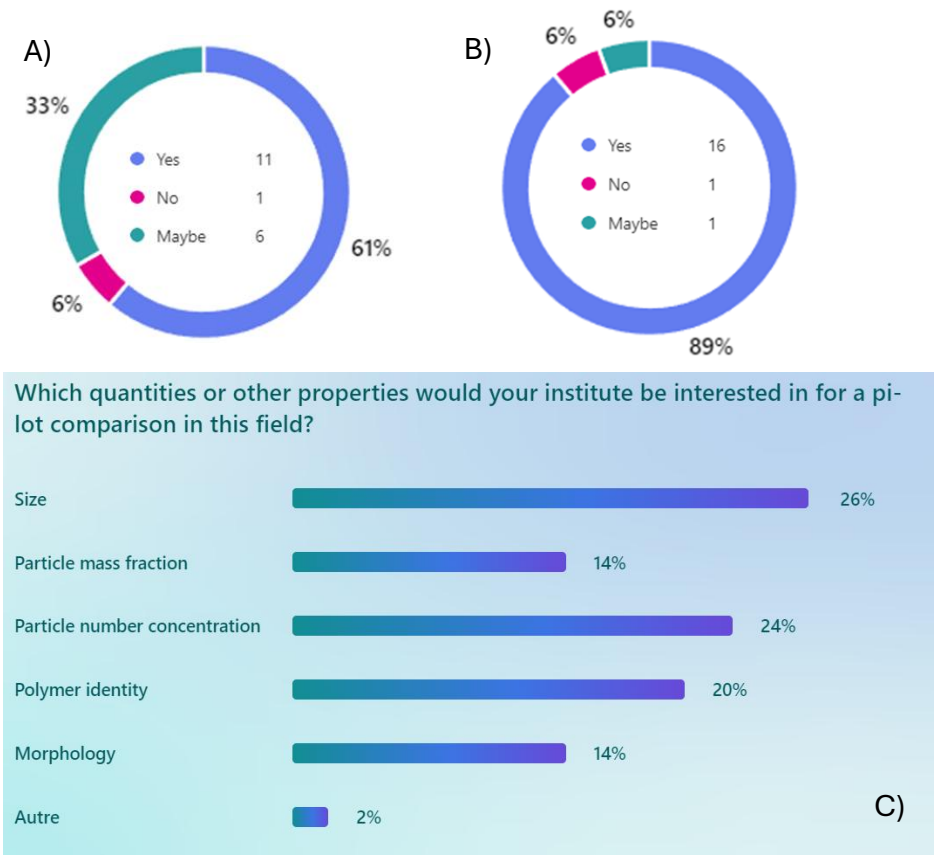


**Figure 1.** Summary of responses from different NMIs regarding their interest and capability for measuring nano- and microplastic-related measurands to the following questions: Would your laboratory be interested and able to participate in a pilot study on the determination of: A) particle concentration (number and/or mass) in microplastic reference materials in the absence of a complex matrix (approximate size range 20-50 µm)? B) particle size distribution and/or concentration in nanoplastic reference materials in the absence of a complex matrix (approximate size range 60-300 nm)? C) Priority measurands for a pilot comparison in nano- and microplastics.

It has been decided to design a manageable CCQM pilot study that:

- Demonstrates current NMI measurement capabilities,
- Improves uncertainty evaluation for key particle metrology measurands,
- Supports the future development of NMI services relevant to future needs.

There is a strong consensus within the CCQM-TG-NMMS that the pilot study must remain focused and reliable, reflecting the varying levels of laboratory maturity worldwide.

Key principles include:

- Limiting the number of measurands and measurement techniques,
- Focus on well-characterised materials and established methods
- Avoiding unnecessary complexity that could impede participation.

While polymer identity and morphology were also identified as priority measurands (Figure 1), the initial selection for the pilot study is proposed to be limited to more robust and widely established measurements, in order to ensure feasibility and broad participation. Hence, the outline of the proposed pilot study is:

1. Particle size
2. Number concentration
3. Mass concentration
4. (Polymer identity – TBD as single polymer test sample is likely)

To provide a sound design of the pilot study, comparisons have been made with interlaboratory studies organised by the Versailles project on Advanced Materials and standards (VAMAS), specifically two recent projects there (VAMAS TWA 45 P2 and VAMAS TWA 45 P3) has informed in the design of the CCQM pilot study. It should be noted that the pilot study proposed by the CCQM TG NMM is not a duplication of the VAMAS ILCs , since the role of VAMAS is to facilitate pre-normative activities supporting documentary standards development, rather than calibration and measurement provision.

During the year, it has become evident that one of the main constraints in the design of the pilot study is the availability and readiness of suitable, well characterised, sufficiently homogenous and stable materials to serve as a study sample. Hence, there is a risk that some of the proposed materials, to be supplied by JRC, may not be available in time. To mitigate this, flexibility and essential contingency options (“Plan B”) have been identified. The Bundesanstalt für Materialforschung und -prüfung (BAM) in Germany has offered to supply one or more of their reference materials if required.

Due to the WG cross-cutting nature of nano- and microplastics measurement field, a distributed coordination model for the pilot study is suggested. This would involve sharing the responsibilities for the pilot study across CCQM-TG-NMMS members rather than assigning a single lead institute or WG. This co-leadership approach is designed to benefit from the established experience of the TG members, such as material development and

provision, study protocol development, statistical analysis and data interpretation requiring technical expertise, and to demonstrate the added value of the combined expertise of the CCQM-TG-NMMS members across the relevant TGs. Therefore, **we propose to extend the duration of the CCQM-TG-NMMS beyond April 2026 and/or to establish a longer term cross-cutting TG to monitor the activities in the nano- and microplastics emerging field of interest and effectively deliver the proposed pilot study**.

## Liaison activities

1. The CCQM-TG-NMMS members remained very active in a number of international pre-normative ILCs and standardisation activities, research projects and regional metrology activities. These activities were shared and reviewed in our virtual meetings, and contributed to keeping up to date with the current developments in this rapidly emerging field.
2. CCQM Working Groups were consulted on current or planned activities relevant to priority measurands, including particle size, number concentration, surface chemistry, and polymer composition. Across CCQM, there is relevant expertise, although activities are not explicitly plastics-focused. Overall, CCQM has broad, distributed capabilities relevant to nano- and microplastics measurands—particularly for particle number concentration, particle size, and surface chemistry—largely demonstrated using surrogate particles and transferable measurement methods.

    - **GAWG** has validated particle tracking velocimetry (PTV) as a reference method for airborne particle number concentration and size, demonstrated using pollen but directly transferable to microplastics. Relevant comparisons on particle number, charge, and future particle size are underway or under consideration.
    - **IAWG** has experience from CCQM-P222, involving number concentration measurements of polystyrene microspheres in aqueous suspension, with several participants using spICP-MS and one using DIA. While no follow-up studies are confirmed, there is openness to further engagement.
    - **OAWG** recognises nano- and microplastics as a strategic area of interest, particularly in relation to polymer identity and additives, but has no active studies at present.
    - **SAWG** identified strong methodological overlap, including work on nanoparticle surface chemistry, Raman methods, and morphology, with several relevant pilot and joint studies (e.g. CCQM-P259, CCQM-P244), although not plastics-specific. The report from the TG on Particle Metrology, once published, also highlights synergies between the TG-NMMS and SAWG.

- **CAWG** has led and participated in multiple studies on particle number concentration, notably CCQM-P222, and is discussing potential future work on sub-micrometre particles, possibly in a cross-WG context.

This underscores the value of a focused CCQM pilot study to consolidate existing expertise and address plastic-specific priorities.

## Final remarks

Lastly, the CCQM-TG-NMMS would like to refer to and echo the initial recommendations from the 2024 report to the CCQM Plenary:

1. *Given the complexity of nano- and microplastic measurement and the increasing regulatory interest in this area CCQM should consider establishing a longer term, cross-cutting Task Group when the term of the current MNPTG concludes. This measurement space includes capabilities currently covered under the activities of the IAWG, SAWG and CAWG in addition to the OAWG.*

2. *Given that half of the NMIs surveyed are actively measuring nano- or microplastics, it would be reasonable for CCQM to consider a pilot study. In practice, organizing such a comparison takes at least one year by which time more laboratories will have established their measurement capabilities for micro- and nanoplastics, thus increasing the size of the participant pool. One of the activities of a longer-term Task Group would be to coordinate the delivery of any pilot study in this area within the existing CCQM WG structure.*

The CCQM TG-NMMS would like to thank CCQM and its WGs for support during its time.

## Recommendations

In summary, the CCQM-TG-NMMS recommends:

- For the CCQM to **approve** the proposed pilot study (document to be supplied by April 10th)
- For the CCQM to **decide** on the governance of this pilot study, if approved. As outlined in the proposal, the current CCQM-TG-NMMS is willing to take on the responsibilities for this, either through an extension of the current TG beyond April 2026 or by the formation of a new, cross cutting TG for a longer term.
- For the CCQM to **consider** the establishment of a longer term cross-cutting TG to monitor the activities in the nano- and microplastics emerging field of interest. One possibility would be to extend the duration of the CCQM-TG-NMMS.