



International Collaboration to Establish Pathways for Comparable Measurements of Micro-and Nanoplastics (MNPs)

NMI Australia leads a CCQM effort and particle metrology pilot study towards improving measurement capabilities regarding MNPs for NMIs and DIs

*National Measurement Institute Australia (NMIA)
Australia (AU)*



The Challenge

Micro- and nanoplastics (MNPs) are now recognized as ubiquitous contaminants across environmental, food, and biological matrices, including air, water, soil, and food systems. Given that most MNPs are reported to originate from larger plastic pieces and raise concerns about their potential as contaminants, this effort aligns with several UN goals that address public health, environmental considerations, and sustainable industrial development. The need for definition of relevant measurands and associated measurement frameworks has been on the horizon over the past few years, as indicated by, for example, the 2021 Workshop on Nanoplastics in Marine Debris in the APEC Region,¹ and remains under development while regulatory and policy drivers are rapidly evolving, creating an urgent need for robust and comparable measurement capabilities.

At the same time, regulatory and policy drivers are rapidly evolving, creating an urgent need for robust and comparable measurement capabilities. In the Asia-Pacific region, there are ongoing efforts to reduce plastic pollution, which includes an emerging concern about MNPs. For example, in Australia, the EPA in New South Wales has the Plastics Plan 2.0 to reduce plastic waste in the environment and in landfill, and to target the impact of microplastics. In China, the Ministry of Ecology and Environment, which drafted a 5-year plan to control plastic pollution in 2021, is currently preparing a 'Technical specifications for marine microplastics monitoring' that closed for public consultation in October 2025. In Thailand, the government has developed a Roadmap on Plastic Waste Management (2018–2030), led by the Pollution Control Department, focusing on reducing single-use plastics, banning microbeads in cosmetics, and promoting circular economy practices.^{2,3,4}

While there is a great deal of interest in MNPs, little or no regulatory limits exist for microplastics in water, food, or the environment, few standardized measurement methods or metrological traceability frameworks exist, and policies remain largely preventive and upstream-focused rather than measurement-based. Hence, there is a real need to develop

¹ Workshop on Nanoplastics in Marine Debris in the APEC Region – report (2022), <https://www.apec.org/publications/2022/08/workshop-on-nanoplastics-in-marine-debris-in-the-apec-region>

² NSW Environment Protection Agency (EPA). Plastics Plan 2.0. <https://www.epa.nsw.gov.au/Your-environment/Plastics/plastics-plan-20>

³ “China unveils 5-year plan to control plastic pollution”, https://english.mee.gov.cn/News_service/media_news/202109/t20210923_952587.shtml

⁴ “3R and circular economy in Thailand: Achievements, Initiatives, Challenges and Opportunities” https://uncrd.un.org/sites/uncrd.un.org/files/12th3r_cp-thailand.pdf

and establish a metrological traceability framework and standardized measurement methods to create the measurement capability necessary to support forthcoming regulatory tools.

The Solution

In 2022, the Consultative Committee on Amount of Substance: Metrology for Chemistry and Biology (CCQM) under the International Committee for Weights and Measures (CIPM) held a workshop to explore NMI's and DI's experience and interest in microplastics. One of the outcomes of the 2022 CCQM workshop was the formation of a task group (TG) on nano- and microplastics measurements and standards (CCQM-TG-NMMS), with a focus on issues identified during the workshop, including proposals for metrology activities related to MNP measurements and standards. To date, the TG has delivered surveys on institutes' current and potential capabilities, identified relevant measurands, and organized a second workshop for stakeholders in 2025.^{5,6}

A Quantifiable Impact

The findings from the workshops and surveys have identified developments over the past 3 to 4 years, including improvements in expertise and capabilities, but also a persistent lack of availability of reference materials and methods. The replies to questions asked of the online participants in the workshops of 2022 and 2025 were compared, and a subset of these is shown in **Figure 1**, regarding level of expertise (**Figure 1a**), and potential directions for the NMIs (**Figure 1b**).⁷

During the past year, the CCQM-TG-NMMS has investigated the possibilities of organizing a pilot study. With the National Measurement Institute of Australia (NMIA) managing the project, the CCQM-TG-NMMS will organize the first-ever pilot study for MNPs in 2026, spanning many of the CCQM working groups. The goals of this pilot study are:

- to test the measurement capabilities of NMIs, demonstrating the state of the art
- to improve the uncertainty assessment for particle metrology measurands
- to support the development and improvement of metrology services that NMIs can provide in the future

⁵ "CCQM Micro- and Nanoplastics Task Group National Metrology Laboratory Survey Results", https://www.bipm.org/documents/20126/213510844/CCQM24-04_Survey+Report+Final/b70609fe-c1fc-cfdc-6278-843db5636ffa

⁶ Details of the TG-NMMS Workshop, February 2025, <https://www.bipm.org/en/committees/cc/ccqm/wg/ccqm-tg-nmms/2025-02-24> (accessed 2026-08-04) https://www.bipm.org/documents/20126/213510844/CCQM24-04_Survey+Report+Final/b70609fe-c1fc-cfdc-6278-843db5636ffa

⁷ Poster: "CCQM Task Group on Nano and Microplastics Measurements and Standards CCQM-TG-NMMS", <https://thebipm150.org/poster-page/10euh2s/>

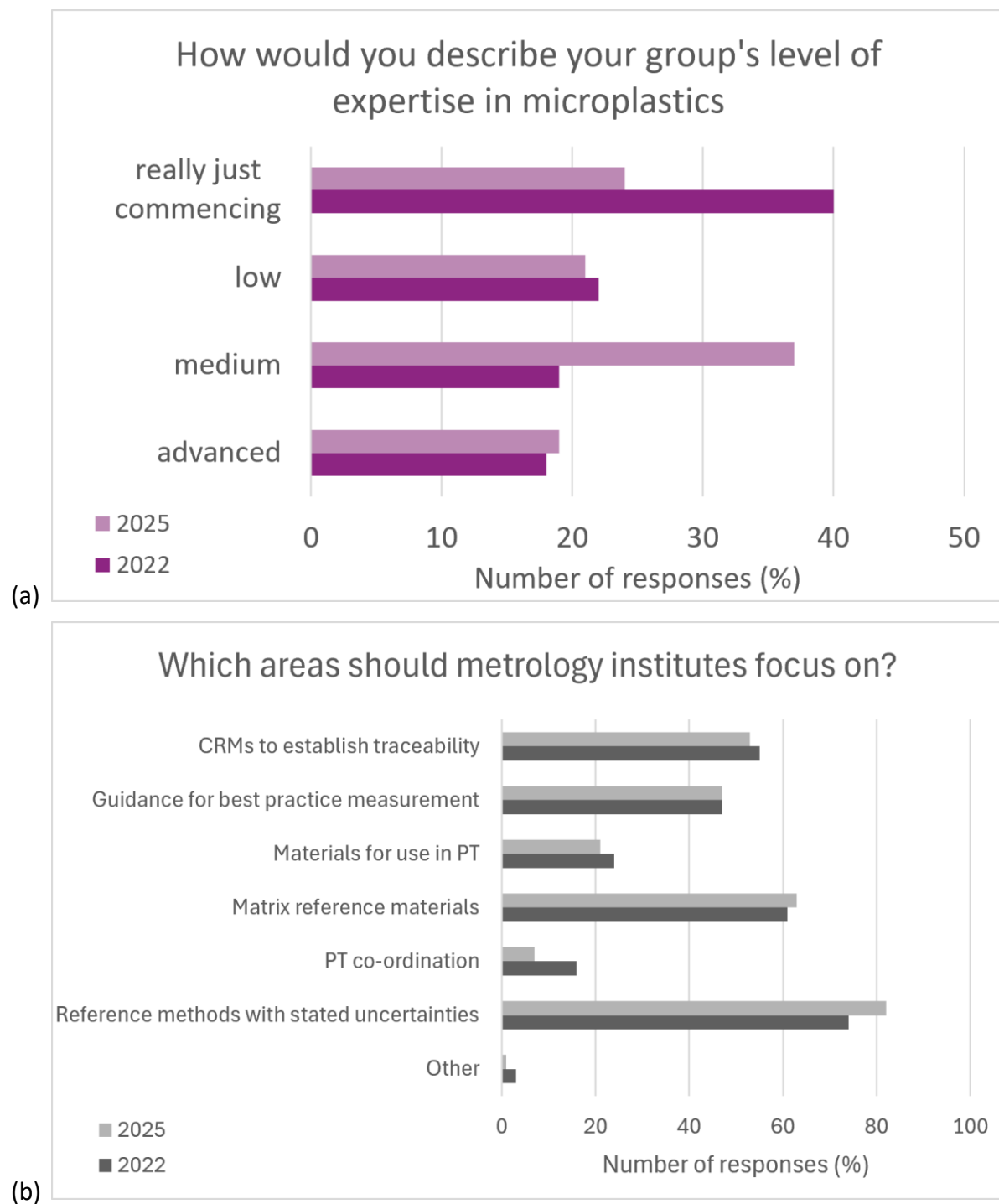


Figure 1. Comparison of responses from workshop participants in 2022 and 2025 regarding a) capabilities and b) focus areas of interest for NMIs.

This proposal was recently presented to the CCQM Plenary meeting in April 2026⁸, and has been accepted, with strong interest indicated among many of the CCQM working groups. Under the umbrella of CCQM Surface Analysis WG (SAWG), the CCQM-TG_NMMS pilot study will be open to all CCQM members, and its outcomes will be shared with all APMP economies.

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POC: Åsa Jämting, asa.jamting@measurement.gov.au

⁸ "CCQM Nano and Microplastics Measurements and Standards Task Group: Final report and recommendations for CCQM"
https://www.bipm.org/documents/20126/289061570/CCQM2026-27_CCQM+TG-NMMS+Final+report+2026/03f7b558-7438-5bcb-839c-d54f9bd2e82f