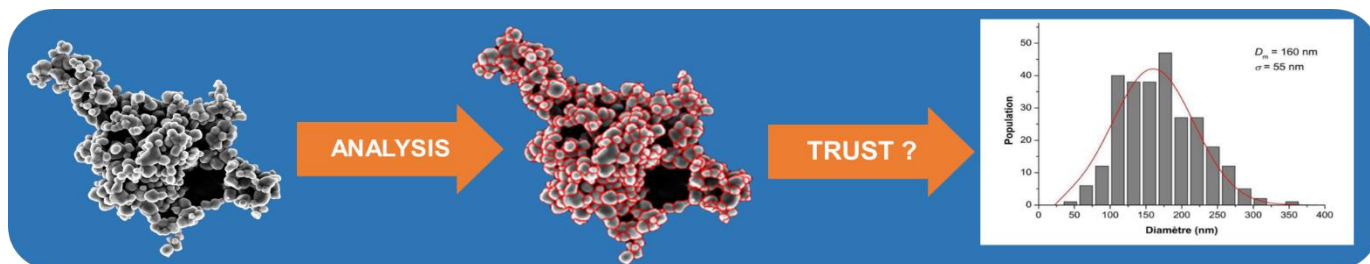


## Call for Participation in an Interlaboratory Comparison on the Performance of Electron Microscopy Image Analysis Software



### BACKGROUND OF THE INTERLABORATORY COMPARISON

The process of identifying nanomaterials relies on determining the number-based size distribution of the constituent particles forming the substance. Methods based on electron microscopy are currently the standard but can be costly, especially when samples are polydisperse or present as aggregates.

Beyond harmonizing sample preparation protocols or obtaining images with sufficient quality to unambiguously identify constituent particles, **automating the image analysis process is one of the preferred ways to reduce the costs inherent in this identification process**.

Various tools are available on the market to simplify this process and minimize operator bias. The rise of artificial intelligence has recently paved the way for the emergence of increasingly fast, versatile tools that reduce human intervention. However, the progress made in recent years should not come at the expense of the trustworthiness of the analysis results, as these can have significant regulatory and economic impacts. Several key players and reference guides (JRC, OECD, European project nPSIZE) have highlighted the need to provide reference datasets to "train" and qualify the performance of such tools.

**NanoMesureFrance proposes to conduct an interlaboratory comparison of electron microscopy image analysis tools** to assess the performance of available technologies in terms of determining the number-based size distribution of constituent particles.

### OBJECTIVES & MODALITIES OF THE INTERLABORATORY COMPARISON

This comparison **aims first to assess the performance of** (manual or automatic) **scanning electron microscopy (SEM) image analysis tools**. This exercise will also serve to define a harmonized framework for the use, demonstration, and comparison of such tools' performance, which could be applied in more complex application cases in the future.

**This exercise will focus on determining the number-based size distribution of constituent particles** and obtaining associated statistical parameters (median diameter by number D50, standard deviation of the distribution, other statistical diameters such as D10 and D90).

**Five samples** will be considered in this exercise, with increasing complexity levels:

- Sample 1: consists of **reference particles that are spheroidal and monodisperse in size**;
- Sample 2: consists of particles whose **D50 is close to 100 nm**;
- Sample 3: consists of **aggregates-agglomerates** of particles that have been **poorly dispersed** on the substrate;
- Samples 4.a and 4.b: consist of particles with a **high size polydispersity**.

For each of these samples, **SEM image datasets will be provided to the participants by the “Laboratoire National de métrologie et d’Essais” (LNE)** to avoid artefacts inherent to the sample preparation or SEM image acquisition processes.

Participants will be provided with a protocol presented and made available by the coordinator before the analysis period of the five image sets.

## EXPECTED RESULTS

"Excel" file templates for formatting the results and "Word" analysis report templates will be sent to each participant to allow them to submit their analyses to the interlaboratory comparison organizer. The organizer will ensure the anonymity and analysis of the results obtained within this interpretation framework.

Each participant will also receive the target values at the end of the comparison, whether they are reference values or consensus values derived from the comparison.

A restitution in the form of a Z-Score and according to the ISO 5725-1:2023 standard *Accuracy (trueness and precision) of measurement methods and results* and a discussion of the conclusions of this interlaboratory comparison will be proposed to the participants with recommendations for good practices that can be drawn from it. A publication of the results may also be considered.

## PARTICIPATION CONDITIONS AND SCHEDULE OF THE INTERLABORATORY COMPARISON

**Registration for this interlaboratory comparison is open for free to members of the NanoMeasureFrance association from 15 April to 31 May 2025.**

*Non-members wishing to participate are invited to contact the secretariat to learn about the associated conditions.*

**The modalities of the exercise will be presented** to the participants through a webinar to be held **in June 2025**. The date on which the **links to the MEB image sets will be made available will be confirmed at that time**.

**Participants will have three months** (from July 1, 2025, to September 30, 2025) to carry out these analyses.

The data will be interpreted by the interlaboratory comparison organizer between October and December 2025 for **a first restitution by the end of 2025**.

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### FOR MORE INFORMATION

Website of the association: <https://www.nanomesurefrance.fr/en/>

LinkedIn: <https://www.linkedin.com/company/88045212>

Contact: [secretariat@nanomesurefrance.fr](mailto:secretariat@nanomesurefrance.fr)

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