



VAMAS

# Nanoparticle Populations Quantitative Microstructural Analysis

TWA 34  
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 recommendation 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

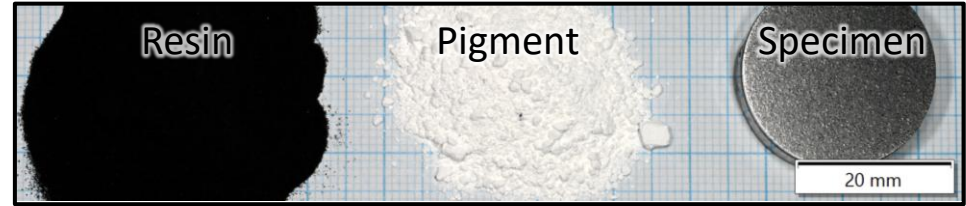


Figure 1: Preparation – Starting materials and finished macroscopic sample

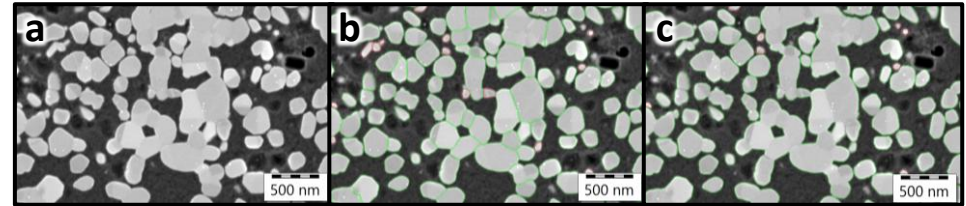


Figure 2: SEM image: a) original; b) with marked isolated and bound primary particles; c) with marked isolated primary particles and aggregates; red particles are nanoparticles

### 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 Spring 2026 and finish in 2028.

### References

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

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