

Project 02

Development of standardized methodologies for characterisation of microplastics with microscopy and spectroscopy methods

Objectives

- Validate the performance of microscopy and spectroscopy methods (μ -IR, μ Raman) and thermogravimetric methods (Py-GC/MS, TED-GC/MS) to measure the particle size distribution, shape, mass content, particle number concentration of microplastic particles (MPs)
- Achieve precision and accuracy of the results for comparability and for pre-standardization and harmonization.

Background

The European Horizon 2020 has organized five projects for research on plastic micro- and nanoparticles into one European Consortium (CUSP, cusp-research.eu/). Within these projects slightly different objectives are set, however, the main common aim is to obtain a set of standard methods for reliable micro- and nanoplastic characterization for risk assessment and better regulation. For the validation of methods, instrumentation and parameters for microplastics an interlaboratory comparison (ILC) is organized to start in January 2023.

Measurement methods

The proposed measurement methods include thermoanalytical (Py-GC/MS, TED-GC/MS) and spectroscopic ones (μ -IR and μ -Raman). With thermoanalytical methods the mass content of the polymer in the sample

can be determined. With spectroscopic methods the particle number concentration and the polymer identity can be obtained.

Standardisation needs

There is a need for standardized measurements of microplastic size distribution, shape, mass content and number concentration, since regulation requires reliable set of methods and accurate, precise results. The ILC is intended to complete the entire sequence of MPs analysis with the aim to include the evaluation of results and methods into new ISO standards.

Work Programme

Pressed pills with a well-defined mass of MPs will be prepared within the Horizon Europe PlasticsFatE project (www.plasticsfate.eu/) by BAM and will be provided to participants together with protocols for sample preparation, analysis and reporting. Final data compilation, statistics and analysis will be undertaken by BAM.

Deliverables and Dissemination

This interlaboratory study will be disseminated at scientific conferences and in a peer-reviewed scientific journal. It is planned to publish the developed measurement protocols and ILC data in a peer-reviewed journal (contributions of all ILC participants to be included in the Acknowledgement section). Further, the gained results for the microplastic number concentration, mass, particle size

CALL FOR PARTICIPATION

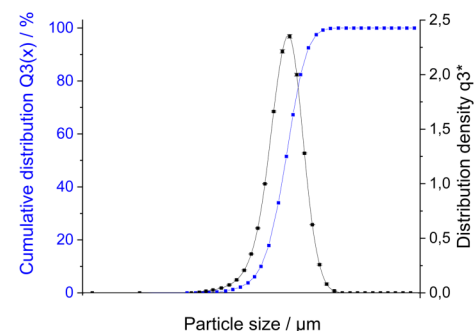


Fig. 1 Generic size distribution of secondary microplastic particles (left) and SEM image (filtered “hot-cyan”) on the right. On the top left of the SEM image a photograph of a pressed pill containing a well-defined amount of microplastic particles is shown.

distribution, including sample preparation protocols for the microscopic, spectroscopic and thermogravimetric methods will be proposed to be included in future standardisation projects under ISO/TC 61 Plastics and ISO/TC 61/SC 5 Physical-chemical properties.

International Participation

Current participation includes volunteers from countries from all continents. Additional participants are welcome to join the ILC via VAMAS according to VAMAS procedures.

Funding

Participants fund their own involvement in the project.

Project Status

The project is due to start in January 2023 for a duration of 6 months.

For more information:

Dr. Dan Hodoroaba

Dr. Dmitri Ciornii

Dr. Korinna Altmann

Project lead

Federal Institute for Materials Research and Testing (BAM), Germany

Dan.Hodoroaba@bam.de

Dmitri.Ciornii@bam.de

Korinna.Altmann@bam.de

Dr. Andrea Mario Giovannozzi

Chair, VAMAS TWA 45

Istituto Nazionale di Ricerca Metrologica (INRiM), Italy

a.giovannozzi@inrim.it