

Analysis of atmospheric microplastics using on-line Thermal Desorption coupled Chemical Ionization-Time of Flight-Mass Spectrometry

Nos réf. : Ineris - [CGR] - ID 2726173

Publication date: 16/10/2024

Location: Verneuil-en-Halatte (60) - accessible by public transport, 40 minutes north of Paris

Contract type: Internship

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CONTEXT

Ineris (National Institute for the Industrial Environment and Risks) employs around 500 people and serves as a national reference body under the supervision of the French Ministry of the Environment. Its primary mission is to conduct studies and research aimed at preventing risks that economic activities pose to the safety of people and property.

Joining Ineris offers an opportunity to apply and enhance your skills through research, support, and expertise missions on behalf of public authorities and industry. Ineris has 30,000 m² of laboratories and facilities equipped with state-of-the-art instrumentation and equipment.

INTERNSHIP OBJECTIVES

The presence of micro- and nano-plastics (MP and NP) in the environment, including in ambient air, is increasingly recognized as a potential health concern. Their large surface area and high sorption capacity enable the accumulation of chemical contaminants, which may facilitate their transmission via inhalation. Despite these risks, real-time measurement of atmospheric microplastics remains a significant challenge and has received limited attention.

Recently, Thermal Desorption coupled with Proton Transfer Reaction Mass Spectrometry (TD-PTR-MS) has been applied to analyze MP and NP in ambient air using filter-based samples. In the field of atmospheric chemistry, PTR-MS is widely used for real-time detection of volatile organic compounds (VOCs) at trace concentrations. By coupling this technology with a thermal desorption interface molecular-level characterization of aerosols can be achieved in real-time.

This internship proposes to use the Vaporization Inlet for Aerosols (VIA) coupled with Chemical Ionization-Time of Flight-Mass Spectrometry (CI-ToF-MS), including PTR-ToF-MS, to achieve real-time detection and molecular-level characterization of microplastics. The core objective of the project is to develop and optimize the VIA-PTR-ToF-MS method to generate molecular fingerprint spectra of selected types of microplastics. This involves fine-tuning the generation of microplastic aerosols from aqueous solutions, utilizing different surfactants (e.g., Tween, BSA). In addition to experimental optimization, a significant portion of the work will involve data processing and analysis, using results obtained from various instruments including PTR-MS, particle sizers, and classifiers.

This work will be performed at INERIS (40 min from Paris, <http://www.ineris.fr>) in the operational unit ANAE (Analytical Methods and Developments for the Environment).

PROFILE

Master or equivalent in Environmental chemistry or Analytical Chemistry.

Experience/Skills

- Laboratory and research work interests.
- Knowledge of mass spectrometry
- Knowledge of air quality is an added value.
- Interests in instrumentation, experimental work, and data treatment
- Autonomy, adaptability, communication and writing abilities.
- Good oral and written English skills.

MISCELLANEOUS

- Location: 100% INERIS
- Desired start date: March 2025 for 6 months

Application procedure:

The application must include: a CV, the grades obtained in the M1 and in M2, a letter describing your motivation and your interest in working on the proposed subject and possibly, one or more letters of recommendation from your current or past teachers and/or supervisors.

- Indemnity: about 550 €/month
- Flexible hours
- Staff canteen
- Charging stations for electric vehicles

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