

## Section Sciences et Ingénierie de l'environnement Design Project 2024 (semestre de printemps)

### Proposition n°5

#### Generation, characterization, and traceability of inhalable microplastics

##### Partenaire externe ou laboratoire IIE

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Taille de l'entreprise (nbre de collaborateurs) : Unisanté : 1000 ; DSTE : 100

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##### Descriptif du projet

Plastics, characterized as synthetic persistent organic compounds, are considered as priority pollutants for the environment. Plastics are polymeric chemicals (>5000) intended for human purpose such as clothing, tires, vehicle interiors, toys, furniture, carpet, bags, bottles, and building materials. Over time and through usage, plastics undergo fragmentation, resulting in the generation of plastic residues that are released into the surrounding environment (outdoor/indoor air and dust). These plastic residues, commonly referred to as microplastics (MPs), exhibit a diverse range of properties, including differences in composition, shape, size, and surface characteristics, all of which play pivotal roles in influencing their potential toxicity. Little is known on the type of polymers, shape, size and concentration of microplastics that are chronically inhaled by humans. The kinetics of absorption and possible exposure-related effects in humans after inhalation exposure to microplastics are unknown. At Unisanté, our toxicologists perform toxicological studies with healthy participants in controlled exposure conditions. To assess the toxicokinetics of microplastics, a device is

required to generate controlled concentrations of microplastics in the air. A device for emitting controlled concentrations of powders is already available in the Unisanté laboratory. This equipment will probably have to be modified for the emission of PMs.

### **Objectif et buts**

The objective of this work is to design/adapt a device capable of generating controlled concentrations of microplastics (MPs) for human toxicology studies.

### **Descriptif tâches**

- Characterize inhalable microplastics and explore methods for tracking their presence and behavior within the human body.
- Investigate existing devices and technologies and customize an aerosolization system for microplastics, taking into consideration factors such as particle size range, concentration range, and control mechanisms.
- Perform testing and calibration procedures to ensure the precise and consistent generation of controlled concentrations of microplastics.
- Establish safety protocols and measures to protect researchers and participants during experiments involving microplastic exposure.

### **Divers**

Lab work will take place in Unisanté Lab. Rue du Bugnon 19, Lausanne (close the University Hospital)