# Abundances and Characteristics of Atmospheric Microplastic within Coarse and Fine Particles in the Urban Area of Peninsular Malaysia

Jenny Lau[1,2*], Norfazrin Mohd Hanif[1], Natasha Arina[1,3], Mohd Talib Latif[1]

[1] *Department of Earth Sciences and Environment, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia.*
[2] *School of Environmental Engineering, Faculty of Engineering & Built Environment, Universiti Kebangsaan Malaysa, 43600 UKM Bangi, Selangor, Malaysia.*
[3] *School of Biological Sciences, Universiti Sains Malaysia, 11800 USM, Pulau Pinang, Malaysia.*

## Abstract

Atmospheric microplastics have gained attention primarily due to their potential health risk resulting from inhalation. In Malaysia, limited data exists on their distribution in the atmosphere. Therefore, this study aims to determine the concentration and characteristics of microplastics in total suspended particles (TSP) and fine particulate matter ($PM_{2.5}$) in the urban air of Kuala Lumpur, as well as the abundance variation across different monsoons. High-Volume Air Samplers (HVAS) were used to collect the air samples from December-2022 until May 2023 on the roof of the Faculty of Health Sciences building, UKM Kuala Lumpur campus. Samples underwent organic matter digestion, density separation, and filtration before analysis. The determination of the concentration and characteristics of microplastics was using an Imaging Rig and SZP series OPTIKA Stereo Microscope, respectively. Our preliminary results showed that during the Northeast monsoon, microplastic concentrations were higher in TSP (13.14 ± 7.57 particles/$m^3$) than in $PM_{2.5}$ (0.54 ± 0.37 particles/$m^3$). During Inter-monsoon, average concentration of microplastics in TSP dropped to 2.92 ± 1.84 particles/$m^3$, while in $PM_{2.5}$ found slightly decreased to 0.35 ± 0.16 particles/$m^3$. The differences in microplastic concentration by particle type and monsoon season were statistically significant ($p < 0.05$). The size of microplastics in TSP and $PM_{2.5}$ was mostly concentrated in the 0.1 – 0.5 mm group. Most of the microplastics in the urban environment are fiber-shaped ($PM_{2.5}$: 58.40 ± 10.45%; TSP: 56.07 ± 5.72%) and transparent ($PM_{2.5}$: 67.27% ± 9.00%; TSP: 60.87 ± 12.88%). Overall, seasonal variations of ambient microplastics were found and higher levels of microplastic concentrations were recorded during the Northeast monsoon season.

***Keywords:*** *ambient microplastic, seasonal variations, urban air*