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## **Characterization of airborne microplastics in different indoor environments in University of Kelaniya, Sri Lanka-A preliminary study**

Saumya R. L. K.<sup>1</sup>, Deeyamulla M. P.<sup>1\*</sup>, De Silva D. S. M.<sup>1</sup>, Athukorala A.<sup>1</sup>, Bakir A.<sup>2</sup> and McGoran A. R.<sup>2</sup>

<sup>1</sup>Department of Chemistry, University of Kelaniya, Kelaniya 11600, Sri Lanka.

<sup>2</sup>Centre for Environment, Fisheries and Aquaculture Science (Cefas), Suffolk NR33 0HT, UK.  
mpd@kln.ac.lk\*

Airborne microplastic (MP) contamination in indoor environments is an increasing concern due to potential health risks from inhalation. This study examined the distribution, polymer composition, and morphology of airborne MPs in five indoor settings at the University of Kelaniya, Sri Lanka. Passive sampling was conducted over 14 days in one office, two laboratories, and two lecture halls. A diverse array of MP forms and colors were identified using stereomicroscopy and advanced micro imaging. Further analyses were carried out using laser direct infrared spectrometer (LDIR) to identify the constituent polymer types of MPs. Fibers dominated the fallout samples in the office (100%), lecture hall 2 (60%), laboratory 1 (56.25%), lecture hall 1 (25%), whereas no fibers were found in the sample taken from laboratory 2. However, fragments were identified only in the sample collected from laboratory 2. Films were present at all locations except the office, but their number was relatively lower compared to fibers. The deposition rates of fibers were  $3.7 \times 10^2$  fibers/m<sup>2</sup>/day in the laboratory 1,  $0.82 \times 10^2$  fibers/m<sup>2</sup>/day in the lecture hall 1,  $1.23 \times 10^2$  fibers/m<sup>2</sup>/day in the lecture hall 2, and  $1.64 \times 10^2$  fibers/m<sup>2</sup>/day in the office. The deposition rates of films in laboratory 1 and the lecture hall 2 were close to each other, corresponding to  $1.64 \times 10^2$  films/m<sup>2</sup>/day. Among the selected indoor environments examined in this study, laboratory 1 exhibited the highest deposition rate of MPs on both fibers and films. The increased accumulation is likely due to the proximity of an active construction site, which could facilitate the transport of MPs into the laboratory. Furthermore, the laboratory's heavy use by approximately 60 students daily may have contributed to higher MPs levels. Conversely, laboratory 2 displayed the lowest deposition rate of MPs. This difference can be linked to several factors, including its relatively lower student occupancy, the shorter durations students spend within the laboratory environment and the air-conditioned nature. In all selected indoor environment settings, the prevalent color among MPs is transparent. Laboratory 1 exhibits a relatively balanced representation of transparent (35.29%), green (35.29%) and red (17.69%) MPs, while laboratory 2 predominantly comprises blue (50%) MPs. Lecture hall 1 shows a significant presence of blue MPs (50%), while lecture hall 2 primarily consists of transparent MPs (60%). The office environment exclusively contains transparent MPs. Laboratory 1 and laboratory 2 predominantly have MPs in the 100–250 μm range, while lecture hall 1 and lecture hall 2 show more varied sizes with larger particles being more prevalent, and the office environment mainly contains particles in the 250–500 μm. LDIR spectroscopy was revealed that the MPs were composed of polyamide (17%), polyethylene (10%), polyurethane (7%), polyester (6%), polypropylene (4%), and acrylonitrile butadiene styrene (2%). This study highlights the prevalence of MPs in various indoor environments, emphasizing the importance of evaluating health risks associated with long term exposure.

**Keywords:** Airborne microplastics, Dry deposition, Indoor, LDIR spectroscopy, Stereomicroscope

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