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Review

The Peril of Plastics: Atmospheric Microplastics in Outdoor, Indoor, and Remote Environments

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Abstract: The increasing commercial, industrial, and medical applications of plastics cannot be halted during the coming years. Microplastics are a new class of plastic pollutants which have emerged as escalating environmental threats. The persistence, effects, and removal of MPs present in soil, water, and numerous organisms have become an important research field. However, atmospheric microplastics (AMPs), which are subcategorized into deposited and suspended, remain largely unexplored. This review presents the recent developments and challenges involved in fully understanding suspended and deposited AMPs. The evaluation of indoor suspended MP fibers needs to be critically investigated to understand their implications for human health. Furthermore, the transportation of AMPs to isolated locations, such as cryospheric regions, requires immediate attention. The major challenges associated with AMPs, which have hindered advancement in this field, are inconsistency in the available data, limited knowledge, and the lack of standardized methodologies for the sampling and characterization techniques of AMPs.

Keywords: plastic waste; atmospheric microplastic; cryospheric; deposition; suspension

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1. Introduction

The Earth has essentially become the home of plastics. Plastics are synthetic polymers which, once formed, cannot be reversed back to their monomers and, when disposed of in the environment, do not naturally decompose into non-toxic products. As a result of this durability and resistance, large landfills and the debris of plastic have intricately released its existence in all forms of the environment. This increasing plastic pollution is an outcome of the Anthropocene Epoch [1]. A large amount of accumulated plastic debris can undergo weathering due to physical, chemical, and biological strains to produce smaller fragments of plastic called microplastics (MPs) and nanoplastics (NPs). The classification of plastics depends on their size. MPs are plastic particles which have a size range of 5 mm–1 µm [2], and they can be further subcategorized into primary and secondary MPs. Primary MPs are obtained from direct sources which are intentionally produced, such as microbeads in personal care products. Contrastingly, secondary MPs are the result of the unintended generation of MPs from the degradation and fragmentation of bulk plastic [3]. Nanoplastics, on the other hand, have sizes smaller than 1 µm [4]. Modified definitions for