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Seperation, characterization and identification of microplastics collected from the Axios river in Greece

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Microplastics (MPs) have globally been detected in aquatic and marine environments, which has raised scientific interests and public health concerns during the past decade. MPs are those polymeric particles with at least one dimension <5 mm [1]. They possess complex physicochemical properties that vary their mobility, bioavailability, and toxicity toward organisms and interactions with their surrounding pollutants [2,3]. Despite the increase in studies on this field, it is a common assumption of researchers that research is still in its early stages, with a lot of unresolved questions that need to be answered. However, it is critical to have accurate and reliable detection and measurement of MPs and their properties in order to have a complete understanding of their environmental and ecological effects.

In this work, microplastics were collected from the Axios river which is the second longest river in Greece, and the second-longest river in the Balkans in order to evaluate some of the most widely used polymers covering a variety of applications in modern everyday life. Greek rivers are heavily polluted by municipal waste in the most highly populated areas of Greece. Different techniques were introduced to demonstrate their working principles, applications, limitations, and advantages, followed by a discussion of perspectives that shed new light on future research and directions. So, the structural and morphological characterization of the selected microplastics were studied with the help of Infrared Spectroscopy with Fourier transform (FT-IR), X-ray Diffraction (XRD), and Scanning Electron Microscopy (SEM). Additionally, Pyrolysis - Gas Chromatography/Mass Spectrometry (Py-GC/MS) was employed for the thermal characterization and dynamic study of polymeric materials. The complementary use of these techniques provides conclusive and convincing results from the studies being carried out on microplastics and their ever-increasing abundance in the environment.

References

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