

Quantification and Characterization of Fine plastic particles as Considerable Components in Atmospheric Fine Particle

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Fine plastic particle (FPP) have made considerable contributions to human health, aerosol pollution, climate effects, and many aspects of the ecosystem. However, the direct characteristics and high-time resolution (hourly) quantitative detection of atmospheric FPP were limited. We investigated the composition and probable sources of FPP in $PM_{2.5}$ in this study. We obtained dual-hour-resolution for the quantitative study of FPP in $PM_{2.5}$ using the Versatile Aerosol Concentration Enrichment System (VACES) and Thermal Desorption/Pyrolysis-Gas Chromatography-Mass Spectrometry (TD/Py-GC-MS). The FPP in $PM_{2.5}$ accounted for an expected value of $5.57 \mu\text{g}/\text{m}^3$ (from 0 to $24.73 \mu\text{g}/\text{m}^3$) and 13.2 % (from 4.1 to 42.6 %) in $PM_{2.5}$. FPP are not significantly correlated with $PM_{2.5}$ yet accounted for in $PM_{2.5}$ concentrations, and PAEs are not part of atmospheric particulate matter yet are highly correlated with $PM_{2.5}$. Additionally, a comprehensive chemical analysis of the FPP in $PM_{2.5}$ has revealed the abundant presence of plastic particles, as opposed to other particles such as soot and tar balls. Heavy pollution of FPP was closely related to local human activities and little to ocean sources. This work implied that FPP in the air are a growing threat and atmospheric stocks of FPP were strongly related to human activity.

