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Magnifying Microplastics: Exploring tire and road wear particles through image and elemental analysis

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Consisting of synthetic and natural rubber and other materials, tire and road wear particles (TRWPs) are gaining attention as emerging contaminants. As vehicle transportation is a main mode for travel, tire abrasion from braking, accelerating, and turning are released into the environment through friction with the road. TRWPs accumulate on road surfaces and have been found in road dust, storm water runoff, coastal waters, rivers, groundwater, and even in our air. These particles may have a significant health impact, however, current data characterizing and identifying these particles and potential mineral encrustation is lacking. This study addresses TRWPs found in the streets of Charleston, South Carolina separated through a density fraction procedure. Characterization of TRWPs is achieved through SEM/EDS and may assist in determining the relationship between density and other particle properties. Density separation is essential for addressing the transport and fate of this non-exhaust traffic particulate matter. SEM images and EDS mapping explore the lowest ($<1.179 g/cm^3$) and highest ($>1.479 g/cm^3$) densities of the collected TRWPs. Through ImageJ processing, particles are analyzed for size and their particle and mineral encrustations. Analyzing TRWPs based on density-separated fractions and fully characterizing them will be essential to understanding how these particles are transported and their potential impacts on biota, from aquatic species to humans.