Uncovering the release of micro and nanoplastics from disposable face masks at times of COVID-19

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Abstract:
The universal use and improper disposal of single-use face masks are raising serious concerns for their environmental impact, owing to the foregone contribution to plastic water pollution during and beyond the pandemic. This study aims to uncover the release of micro/nanoplastics generated from face mask nonwoven textiles once discarded in the aquatic environment. As assessed by microscopy and flow cytometry, the exposure to different levels of mechanical stress forces (from low to high shear stress intensities) was proved effective in breaking and fragmenting face mask fabrics into smaller debris, including macro-, micro-, and nano-plastics. Even at low shear energy densities, a single mask could release in water thousands of microplastic fibers and up to 10^11 submicrometric particles. The latter were quantified using flow cytometry that was proven to be a promising technique for nanoplastic counting, thus improving our understanding on distribution and fate of NPs still representing a great analytical challenge in plastic pollution research.