Optical, spectroscopic and thermal analysis of fibers released during laundry washing cycle

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Abstract

One of the pathways for microplastics release into the environment is from the household wastewater. A significant number of plastic fibers is released during laundry washing, and all those fibers eventually end up in community wastewater. Such wastewater is partially treated before release into rivers and seas, but not enough to be completely fiber free. One way to lower the amount of released fibers is using specially designed laundry bags, which capture fibers during the washing cycle and prevent their release into the environment. For this study, such a bag was used to capture fibers from polyester and polyamide clothes during the washing cycle. Captured fibers were analyzed with FTIR, optical microscopy and DSC before and after the washing cycle. FTIR analysis of fibers before washing confirmed agreement between analyzed and declared material. Comparing results before and after the washing cycle showed that during the washing cycle, partial thermal degradation occurs, which affects the proper identification of released fibers.

Keywords: microplastics, plastic fibers, FTIR, optical microscopy, DSC, laundry, wastewater

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