# How can we deal with the large amount of microplastics delivered to landfills and released into the environment by fast fashion? A practical valorization approach for mitigating textile fibrous microplastics before affecting the environment.

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**Abstract**

Fast fashion continuously promotes the mass consumption of clothes and, because of a non-linear economy, the disposal of textile waste. The generation of textile waste is expected to increase further and has already been shown to significantly contribute to the release of fibrous microplastics (FMPs) into the environment. FMPs are the primary microplastic (MP) in the air, and FMP (and MP) contamination is a global concern to address to prevent negative impacts on human health and the environment. The collection of textile waste microfibers during the textile manufacturing processes, i.e., finishing of fabrics, and valorization in construction materials such as fiber-reinforced cementitious composites (FRCs), is here proposed to limit FMPs spread. A thorough characterization of the textile waste microfibers allowed the description of their size, composition, and the main features required for their use in FRCs (density, water absorption, water release in time). Microfiber contents 0-4 wt% and three different microfiber conditions were considered in Portland cement: water-saturated, NaOH-treated, and untreated. The increase in microfiber content significantly promoted the physical-mechanical properties and insulating power of unreinforced Portland cement. And water saturation and NaOH treatment were more successful in reducing linear shrinkage and increasing toughness. For the first time, this work showed a practical mitigation approach of FMPs through the valorization of textile waste to manufacture sustainable and efficient FRCs. Notably, the results displayed that the same amount of FMP fallout in Paris daily can be mitigated per ton of cement paste to create valuable and promising construction materials.

**Keywords:** plastic consumption, fast fashion, fibrous microplastics, microfibers, textile, waste, construction materials, recycling, mitigation.

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