

Fabrication of Microsieves with integrated supporting structure for wastewater treatment

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The insufficient removal of microplastics is a problem in modern wastewater treatment. Often the plastics are passing the treatment plants and reach the rivers and seas. [1] We develop here a new way to fabricate Microsieves with a supporting structure that increases their stability, integrated in the sieve and created in one step: On a water surface, a pretreated polyester net is placed as supporting structure. Hydrophobic siloxane particles with 9 μm diameter are sprinkled on the water surface and are moved gently through the surface in a constant nitrogen flow to assemble in one dense monolayer on the water surface via ultrasonic treatment. The supporting structure is swimming on the water surface during this process. The Particles and the supporting structure combined are embedded in a polymer membrane by spreading a solution of monomer, initiator and a water immiscible solvent on the particle monolayer, evaporation of the solvent and polymerization by ultraviolet radiation. The Particles are removed by an aqueous solution of hydrofluoric acid to generate the pores of the microsieve.

The received microsieves have an especially low flow resistance and can be currently generated in areas of nine centimetre diameter. Especially the design and the ratio of the membrane thickness to the average pore size of six micrometers leads to a high selectivity for most of the microplastics while the sieve is reflushable.

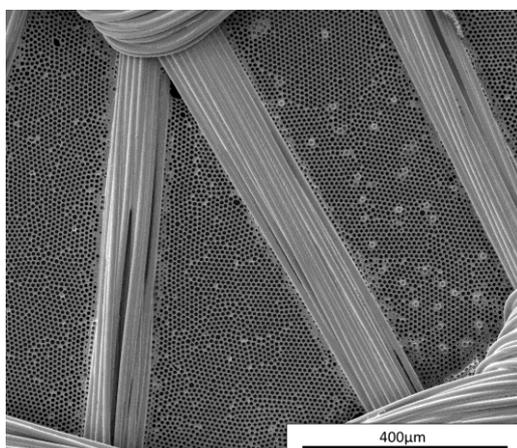


Figure 1. Microsieve with integrated supporting structure in a SEM – Image with a pore size of 6 micrometers.

[1] S. Ziajahromia, P. A. Nealea, L. Rintoulb, F. Leuscha. *Water Research* **112** (2017) 93-99.

[2] F. Murphy, C. Ewins, F. Carbonnier, B. Quinn, *Environmental Science and Technology* **50** (2016) 5800–5808.

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