

Reactive polymer membrane for water disinfection and chemical contaminant removal

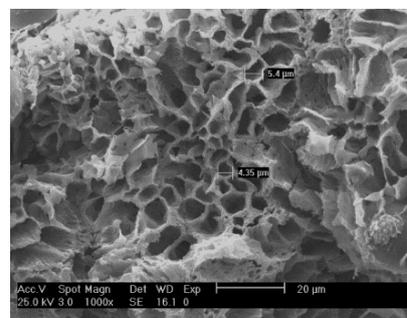
The Spanish National Research Council (CSIC) has developed a polymer membrane for water treatment that acts as antimicrobial disinfectant, while allows removal of chemical contaminants typically present in industrial water. The hydrodynamic resistance of this membrane allows treating high water fluxes and its UV resistance increases its lifetime. Its biocidal effect has been successfully tested for *Escherichia Coli* (*E. Coli*), where after short exposure time the bacteria is totally removed without affecting membrane flux, thus revealing its antifouling effect.

An industrial partner interested in manufacturing this membrane under a license agreement for its application in industrial water treatment plants is sought.

Improved biocidal effect at high flux

The invention is related to a porous polymer membrane consisting in a matrix of polyvinylidene fluoride (PVDF) with entrapped TiO₂ nanoparticles. The synthesis method combines PVDF and nanoparticles in a particular way, conferring to this membrane suitable hydrodynamic resistance with values commonly observed in ultrafiltration membranes, being $9 \times 10^{10} \text{ m}^{-1}$ and an adequate porosity (1-10 μm).

The results of tests carried out with UV light (30 mW cm^{-2}), showed the reduction of *E. Coli* from an initial concentration of 10^7 CFU, up to almost total elimination, after recirculation of the dissolution during 90 min through the membrane, while an average caudal of $85 \text{ Lh}^{-1}\text{m}^{-2}\text{bar}^{-1}$ was kept.



Scanning electron microscopy of porous membrane PVDF-TiO₂

Main applications and advantages

- This membrane exhibits antibacterial properties at mild irradiation conditions.
- The aforementioned mild irradiation conditions plus the high radiation resistance of PVDF allows an increase in the lifetime of this membrane.
- Its excellent self-cleaning or antifouling effect avoids the occlusion of membrane.
- The membrane combines the properties of high flux and excellent biocidal effect.
- PVDF matrix confers good thermal stability and suitable flexibility to this membrane.

Patent Status

Spanish patent filed with possible international extension.

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