

Initial testing of electrospun nanofibre filters in water filtration applications

Decostere Bjorge¹, Nele Daels¹, Sander De Vrieze², Pascal Dejans¹, Tamara Van Camp², Wim Audenaert¹, Philippe Westbroek², Karen De Clerck², Charlotte Boeckeaert¹ and Stijn WH van Hulle^{1*}

¹ Research Group EnBichem, Departement of Industrial Engineering and Technology, University College West Flanders, Ghent University Association, Graaf Karel de Goedelaan 5, B-8500 Kortrijk, Belgium

² Ghent University, Department of Textiles, Technologiepark 907, B-9052 Gent, Belgium

Abstract

The aim of this study was to evaluate the use of nanofibre microfiltration membranes, spun by an innovative electrospinning technique, in water filtration applications. As such, this study bridges the gap between developments in electrospinning techniques for the production of flat-sheet membranes and the application of these membranes in water filtration. Three different applications were examined. Firstly, the use of the membrane (functionalised or non-functionalised) for the removal of pathogens was investigated. Secondly, the electrospun flat-sheet membranes were applied for wastewater treatment in a laboratory-scale submerged membrane bioreactor (MBR). In addition to these applications, physical properties such as clean water permeability (CWP) and strength were also examined. The tests showed that the electrospun membranes can be used for water filtration applications, but that further improvements are necessary before these membranes can be practically employed. In particular, the level of functionality and the properties of irreversible fouling require further research.

Keywords: electrospinning, nanofibre, microfiltration, pathogen removal, MBR