Chemical decontamination of polluted water

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Abstract

Fresh water is a scarce good because is the six percent of the total Earth water. Guarantee the access to drinking water, under full potential scenarios, is a necessity in case of manmade or accidental events and technologies for the decontamination is need.

Authors demonstrated the benefit of electrospun nanofibres membranes in water decontamination in case of chemical pollution and their excellent adsorption properties to reduce pollutant concentration due to their high large-to-volume ratio. Electrospinning is a simple, low-cost and versatile method for fabricating continuous fibers with diameters ranging from micrometers to few nanometers. Poly-acrilonitrile (PAN) and Polyamide-6 (PA6) materials have been selected among others[1] water treatment materials because of their mechanical properties and their extensive use in commercial microporous water membranes. Several author combine the commercial membranes with electrospun layers, in the present work, authors manufacture electrospun thick layer membranes with substrate with a high mechanical performance and easy to handle for their direct use in the decontamination process.

Material manufacturing conditions has been optimized to achieve homogeneous diameter distribution in nanofibers membranes and their diameter and morphology were observed by SEM, figure 1.

The chemical decontamination test was been carried out by an organic pollutant simulant, methyl orange (MO) dye. MO adsorption in both nanofibers membranes was investigated using a UV-vis/NI (Perkin Elmer Lambda 950) in the wavelength range 380nm - 1000nm. Initial MO concentration in water was 3mg/l. As shown in figure 2, after 90 minutes more than 60% and 70% of MO was eliminated of the initial solution from PA6 and PAN respectively. The pronounced pollutant concentration decrease is significant in comparison with previous studies [2].

The experimental evidences allow us to conclude than electrospun nanofibres membranes are a really fast and efficient solution for polluted water decontamination based on adsorption phenomena.

References

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[2] Chureerat Prahsarn, Wattana Klinsukhon, Nanjaporn Roungpaisan. Materials Letters 65, **15-16** (2011) p 2498.

Figures

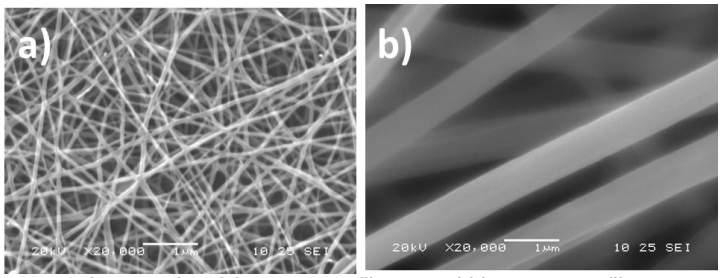

Figure 1. SEM micrographs: (a) PA6 nanofibers and b) PAN nanofibers membranes.

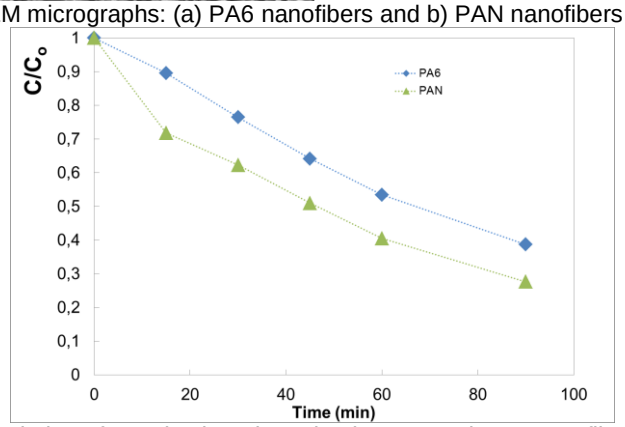

Figure 2. Degradation of MO dye by adsorption in PAN and PA6 nanofibres membranes.