P9. Novel hybrid nanofibrous membranes of Nylon 6/Yeast cell wall components for potential removal of heavy metal contaminants

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Nanofibrous membranes can be obtained by the application of high electrostatic potentials, a process known as electrospinning, showing very large surface-to-volume ratio, high porosity and interconnectivity, making them very attractive for applications like filtration, enzymatic membrane reactors, tissue engineering, sensors, or delivery matrices for bioactive and pharmaceutical compounds [1]. With the aim of obtaining nanofibrous materials with improved filtration capability and adequate performance to remove heavy metals as contaminants, for example from wastewater, we have fabricated and characterized electrospun nanofibrous membranes from nylon 6 (N6) and yeast cell wall (YCW) components. Two main biopolymeric samples were obtained by sequential extraction of yeast cell by-products with water and alkaline solutions [2]: a YCW-rich extract and a mannoprotein-rich extract (MP). Membranes of N6 alone showed satisfactory mechanical properties. SEM analysis revealed arrays of randomly distributed fibers with high porosity, and average fiber diameter of 235 nm and water contact angle (WCA) of 101°. FTIR analysis confirmed the presence of the biopolymeric components in the hybrid membranes that in general increased the membrane surface hydrophobicity. N6/YCW membranes had similar overall tensile strength properties and fiber diameters but the N6/MP membranes showed higher fiber average diameter, lower stress at break point, lower stiffness and higher elongation. Based on the potential sorption ability of yeast cell wall components [3], sorption experiments were performed for cadmium and lead cations. Promising results have been obtained and further studies are underway to better characterize the effect of initial meal ion and pH and the relative ratio of the polymeric fiber components on the sorption process.

References

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