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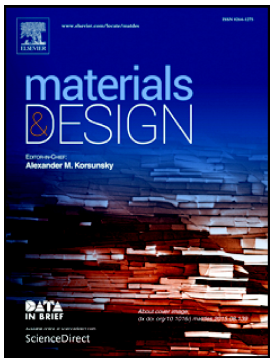

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The preparation, properties and applications of electrospun co-polyamide 6,12 membranes modified by cellulose nanocrystals

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Abstract:

In this paper, we present the preparation and properties of a unique material system manufactured by electrospinning of co-polyamide 6,12 (coPA) from an n-propanol solution. A significant advantage of this system is that n-propanol is considered a safe organic solvent. According to the literature, no polymers have been electrospun from this solvent until now. The co-polyamide nanofibers were modified using cellulose nanocrystals, which were prepared by a simple one-step method from date palm leaves. This was done to enhance their mechanical properties and increase their hydrophilicity. The addition of 1 wt.% of cellulose nanocrystals improved the Young's modulus by 224% and the tensile strength of the composites by 110%.

The electrospun coPA fibers showed a significantly higher hydrophobicity than spin-coated foils. The contact angle of water measured on an electrospun mat was 134°, whereas the contact angle measured on a coPA foil was 84°.

Selected freestanding coPA electrospun mats were tested for their potential as membranes for vegetable and diesel oil extraction from oil/water mixtures. High sorption efficiency of up to 98% was demonstrated.

Keywords: copolyamide, cellulose nanofibers, electrospinning, oil extraction