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cFabrication and Post-treatment of Nanofibers-covered Hollow Fiber Membranes for Membrane Distillation

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KEY WORDS: hollow fiber membrane; nanofiber; electrospinning; membrane distillation; desalination

ABSTRACT:

Novel nanofibers-covered hollow fiber membrane (N-HFM), combining the advantages of both electrospun nanofibers film and hollow fiber membrane was fabricated via electrospinning with non-rotational collectors. The key parameters of electrospinning including positive voltage, negative voltage, polymer concentration and working distance were optimized to examine their effects on the morphology and structure of N-HFM. Meanwhile, a solvent vapor welding post-treatment was firstly applied to enhance the mechanical strength of hollow fiber membranes. The welding can improve the mechanical property and water repellency as well as maintain the high porosity, by fusing the nanofibers just at junctions. After a 40 min welding, the Young's modulus, strain at break and tensile strength of the welded N-HFM increased by 117 %, 79 % and 90 % respectively, compared to the pristine N-HFM. Furthermore, the welded N-HFM was able to present a high flux of $13.2 \text{ L m}^{-2} \text{ h}^{-1}$ and a stable salt rejection of over 99.9% during the 5 h of direct contact membrane distillation (DCMD)

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