

Enhancing Mechanical Properties and Flux of Nanofiber Membranes for Water Filtration

ABSTRACT

Nanofibres have gained attention for their highly porous structure, narrow pore size, and high specific surface area. One of the most efficient techniques for producing nanofibres is electrospinning. These fibres are used in various fields, including water filtration. Although they possess the ability to filter various components, the fibres generally have low mechanical strength, which can mitigate their performance over time. To address this, studies have focused on enhancing nanofibre membrane strength for water filtration. Previous analyses show that the mechanical properties of nanofibre mats can be improved through solvent vapour treatment, thermal treatment, and chemical crosslinking. These treatments promote interfibre bonding, leading to the improvement of mechanical strength. However, excessive treatment alters nanofibre behaviour. Excessive heat exposure reduces interfibre bonding, while too much solvent vapour decreases pore size and mechanical strength. Thus, a comprehensive understanding of these post-treatments is crucial. This review examines posttreatments aiming to increase the mechanical strength of nanofibre mats, discussing their advantages and disadvantages. Understanding these treatments is essential for optimising nanofibre membrane performance in water filtration and other applications.