

Advances in High-Throughput, High-Capacity Nonwoven Membranes for Chromatography in Downstream Processing: A Review

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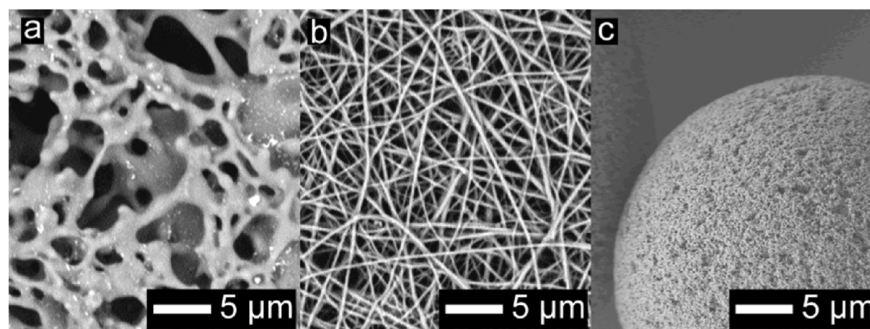
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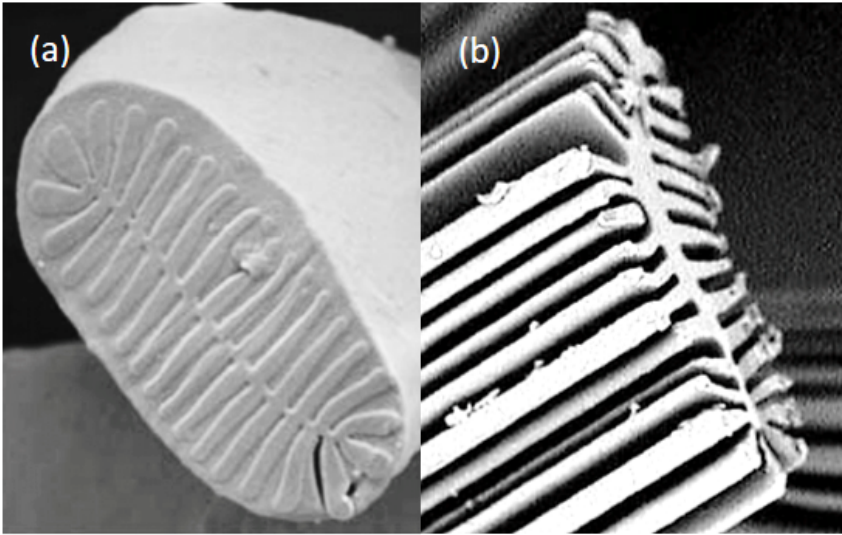
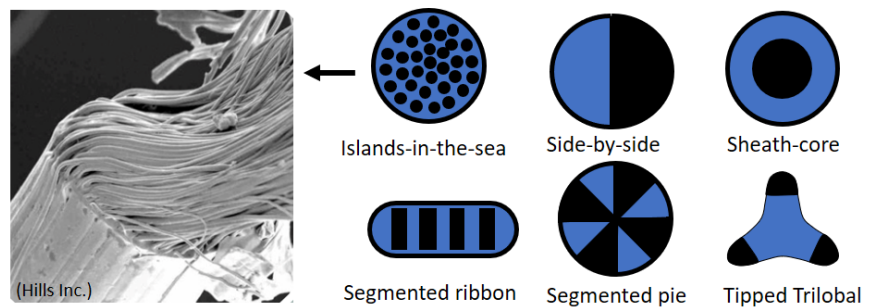
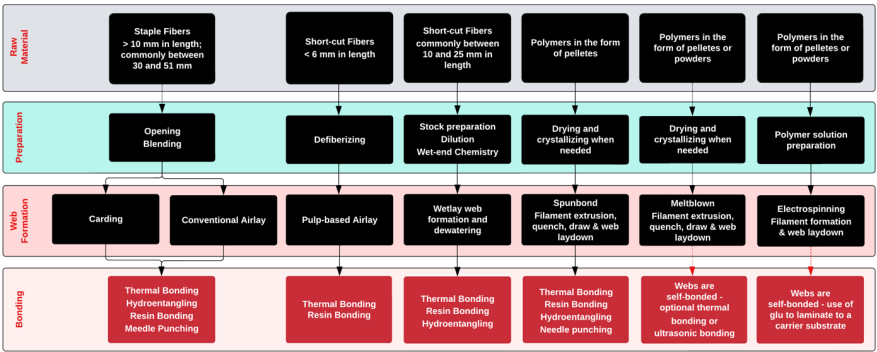
Abstract

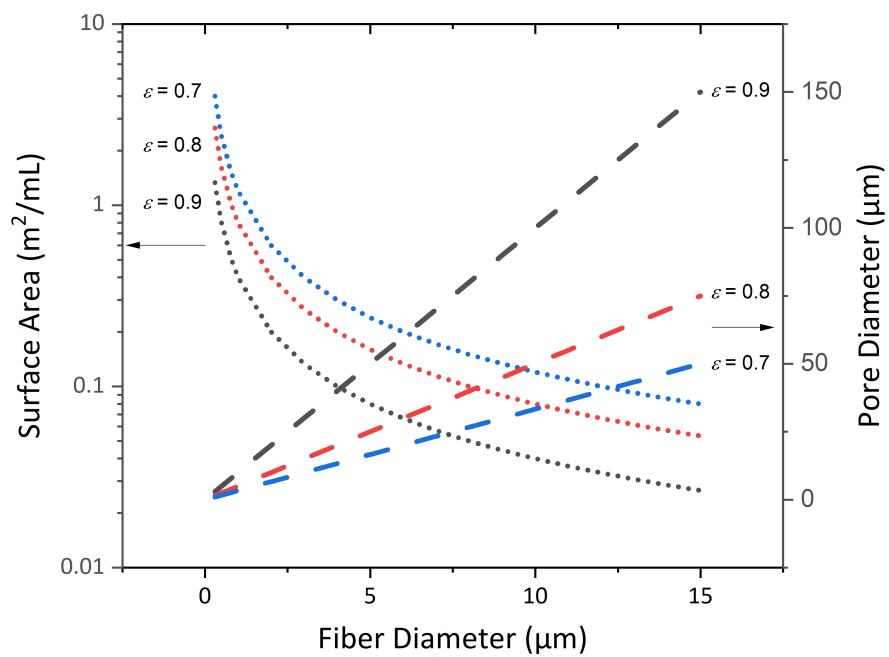
Nonwoven membranes are highly engineered fibrous materials that can be manufactured on a large scale from a wide range of different polymers, and their surfaces can be modified using a large variety of different chemistries and ligands. The fiber diameters, surface areas, pore sizes, total porosities, and thicknesses of the nonwoven mats can be carefully controlled, providing many opportunities for creative approaches for the development of novel membranes with unique properties to meet the needs of the future of downstream processing. Fibrous membranes are already finding use in ultrafiltration, microfiltration, depth filtration, and, more recently, in membrane chromatography for product capture and impurity removal. This article summarizes the various methods of manufacturing nonwoven fabrics, and the many methods available for the modification of the fiber surfaces. It also reviews recent studies focused on the use of nonwoven fabric devices in membrane chromatography and provides some perspectives on the challenges that need to be overcome to increase binding capacities, decrease residence times, and reduce pressure drops so that eventually they can replace resin column chromatography in downstream process operations.

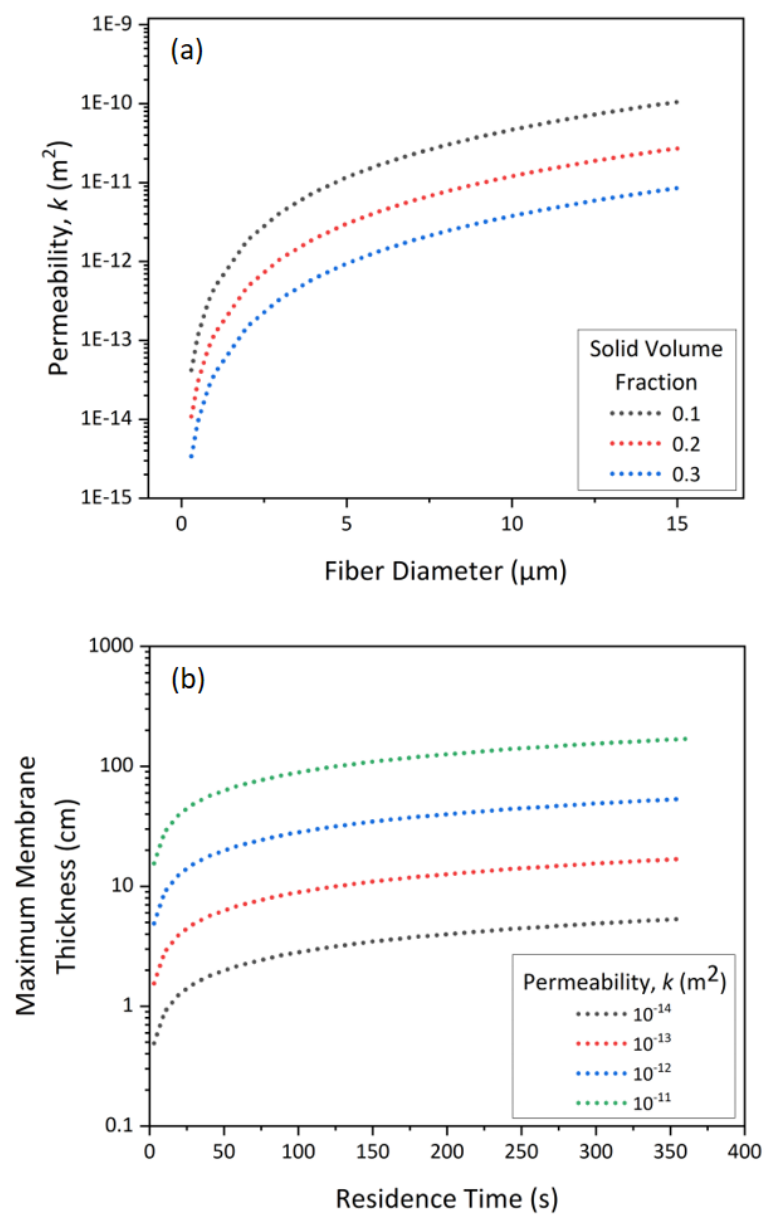
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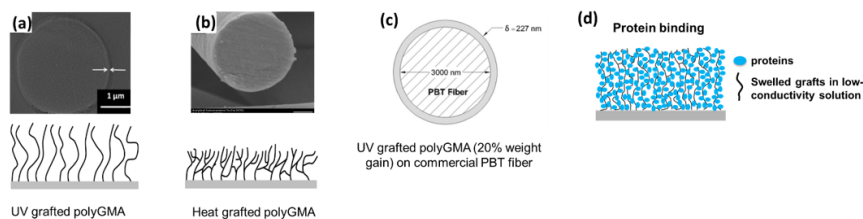
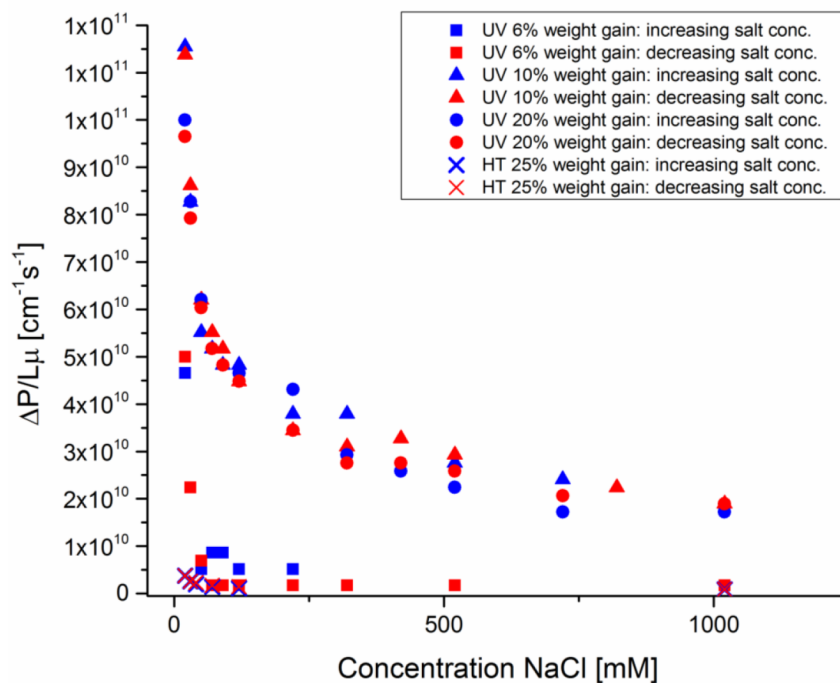
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