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Cellulose as Sustainable Materials for Separation Membranes¹

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Polysaccharides, while complex, form one of the most abundant sustainable resources on earth. We want to take advantage of fundamental advances in materials understanding across length and time scales to investigate the interrelationships between structure, morphology, processing, properties, performance, and cost to meet the specific challenges arising from separation membranes for water purification. Non-woven fiber mats have unique properties, such as interconnected pores, a very large surface-to-volume ratio, and a high capacity for surface modifications. The breakthrough concept of combining fibrous mats composed of different fiber diameters for fabricating scaffolds as a unique platform for water purification is presented. Further, we take advantage of recent advances in chemical modifications, structural studies using synchrotron X-rays, and physical scale-up transformations to drastically improve filtration membrane development.

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