

Recent Development and Environmental Applications of Nanocellulose-Based Membranes

ABSTRACT

Extensive research and development in the production of nanocellulose production, a green, bio-based, and renewable biomaterial has paved the way for the development of advanced functional materials for a multitude of applications. From a membrane technology perspective, the exceptional mechanical strength, high crystallinity, tunable surface chemistry, and anti-fouling behavior of nanocellulose, manifested from its structural and nanodimensional properties are particularly attractive. Thus, an opportunity has emerged to exploit these features to develop nanocellulosebased membranes for environmental applications. This review provides insights into the prospect of nanocellulose as a matrix or as an additive to enhance membrane performance in water filtration, environmental remediation, and the development of pollutant sensors and energy devices, focusing on the most recent progress from 2017 to 2022. A brief overview of the strategies to tailor the nanocellulose surface chemistry for the effective removal of specific pollutants and nanocellulose-based membrane fabrication approaches are also presented. The major challenges and future directions associated with the environmental applications of nanocellulose-based membranes are put into perspective, with primary emphasis on advanced multifunctional membranes.