

Keynote Paper

Preparation of ceramic nanofiltration membrane for sustainable water production

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ABSTRACT

The preparation and application of ceramic nanofiltration (NF) membranes for advanced water treatment have been limited due to difficulties of controlling pore size at the nanoscale. In this study, we propose the filtration technique with variously sized nanoparticles (42nm~101 nm) to pack pores of ceramic ultrafiltration (UF) membrane. The prepared ceramic membranes exhibited narrowly distributed pore sizes (4.3±0.7 nm) with more than 90%, 65.0%, and 55 % of removals for dissolved organic carbon (DOC), geosmin, and hardness, respectively, while unmodified ceramic membrane showed less than 10% of removal for DOC, geosmin, and hardness. The tuned pore size also enabled the control of molecular weight cut-off from 5,000 Da to 1,000 Da as the size of packed nanoparticles were decreased. Moreover, the porosity of mixed two spheres was calculated by Hagen-Poiseuille equation ranged from 27 % to 30%, which implied that pores of ceramic UF membrane were effectively packed by filtered nanoparticles. Thus, the ceramic NF membranes prepared by the filtration technique could be applied for advanced water treatment as well as fine biochemical industries with versatile operation conditions and MWCOs.

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