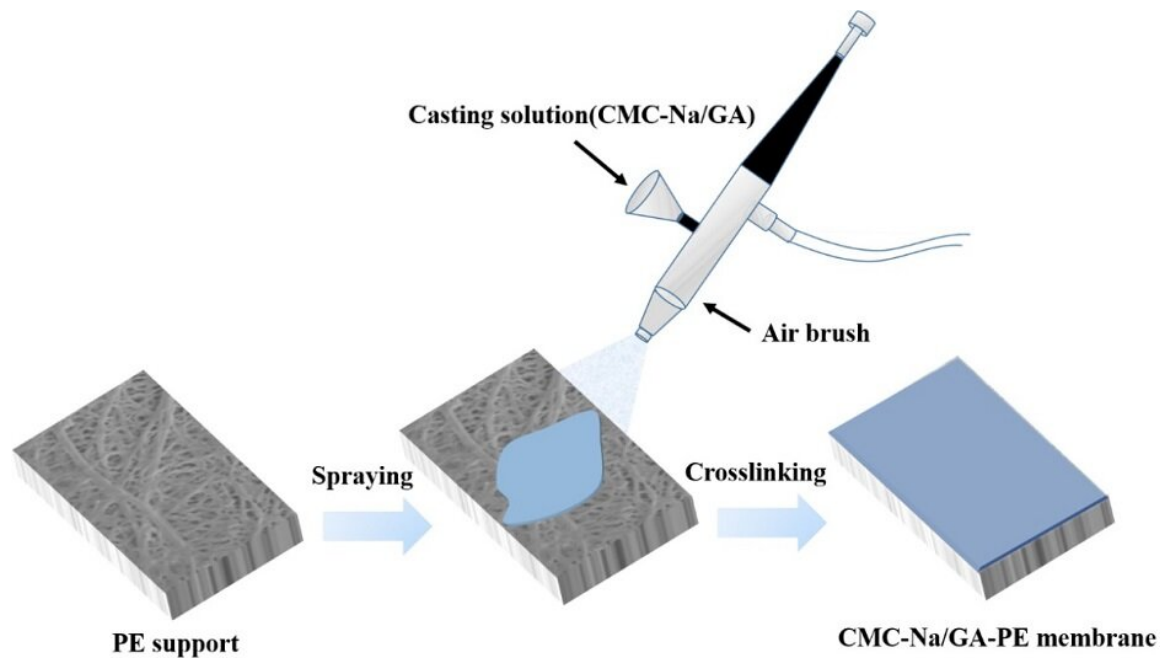


Pervaporation membranes show promise for alkaline wastewater reclamation

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A (CMC-Na/GA)/PE composite membrane was prepared by spray-coating and showed excellent property for alkali water reclamation. Credit: Jianzhong Xia, Pei Li

Industrial processes often generate a large amount of alkaline waste solutions. The existing alkali treatment processes require high investment, and are complicated and have a low rate of efficiency. Membrane technology has the advantages of high efficiency and energy

savings. However, current polymeric membrane materials are not strong enough in harsh alkaline environments. To solve this problem, Prof. Li Pei from Beijing University of Chemical Technology and Dr. Jianzhong Xia from Shenzhen University have developed an alkali-resistance pervaporation membrane. The relevant work was published in *Frontiers of Chemical Science and Engineering* on March 28, 2022.

In this work, they synthesized a super alkali-resistant polymer-sodium carboxymethyl cellulose, and coated it on top of a chemical stable polyethylene porous substrate. They also created a spray-coating technology to solve the incompatible problem between the hydrophobic polyethylene layer and the sodium carboxymethyl cellulose layer. Pervaporation flux of the composite membrane reached $35 \pm 2 \text{ kg}\cdot\text{m}^{-2}\cdot\text{h}^{-1}$ with a sodium chloride rejection of $99.9\% \pm 0.1\%$ when separating a 3.5 wt-% sodium chloride solution at 70 °C. The desalination performance was stable after soaking the membrane in a 20 wt-% NaOH solution at [room temperature](#) for 9 days and in a 10 wt-% NaOH solution at 60 °C for 80 h. Moreover, the membrane was stable in 4 wt-% [sulfuric acid](#) and a 500 mg·L⁻¹ sodium hypochlorite solution. In a process of concentrating a NaOH solution from 5 to 10 wt-% at 60 °C, an average water flux of $23 \text{ kg}\cdot\text{m}^{-2}\cdot\text{h}^{-1}$ with a NaOH rejection over 99.98% was obtained.

Because the composite membrane has excellent alkali resistance, the membrane material shows good application prospects in alkali concentration in papermaking, the electroplating industry, water resource recovery in the coal chemical industry, and in the alumina production industry.

More information: Guiqin Bai et al, Fabrication of high-performance pervaporation composite membrane for alkaline wastewater reclamation, *Frontiers of Chemical Science and Engineering* (2021). [DOI: 10.1007/s11705-021-2078-2](#)

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