

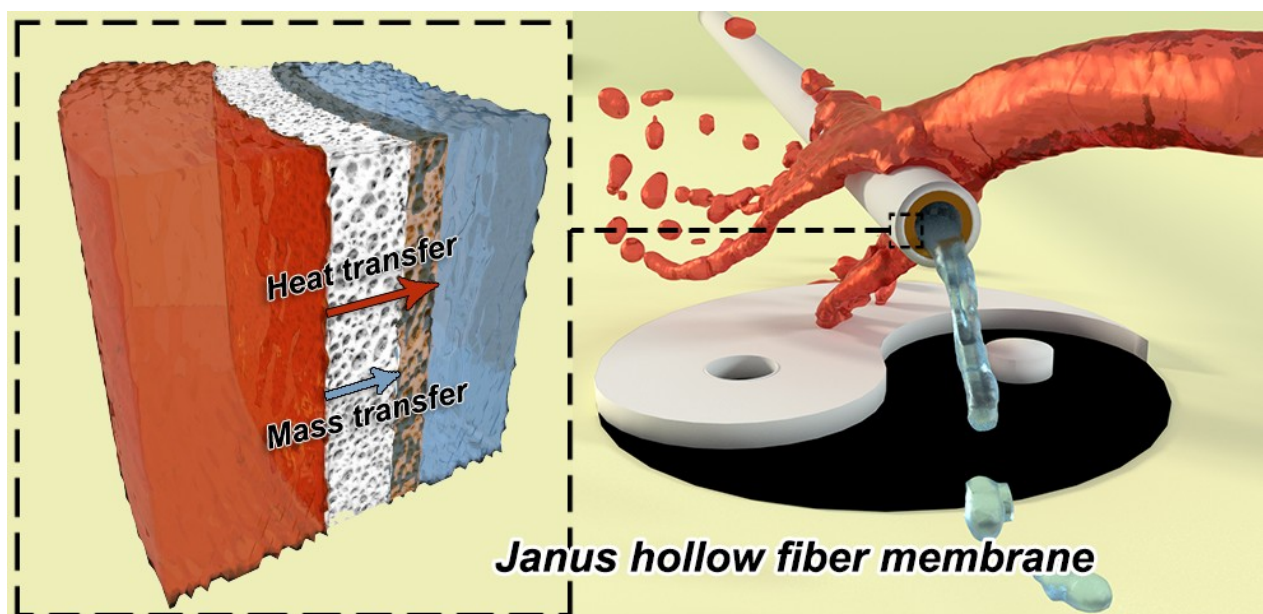
Highly concentrated brine treatment using membrane distillation and pervaporation techniques for zero discharge

Project overview

Developing surface modified porous membrane for membrane distillation and dense polyvinyl-alcohol (PVA) membrane for the treatment of highly concentrated brine solution towards zero discharge.



Surface functionalization for membrane distillation



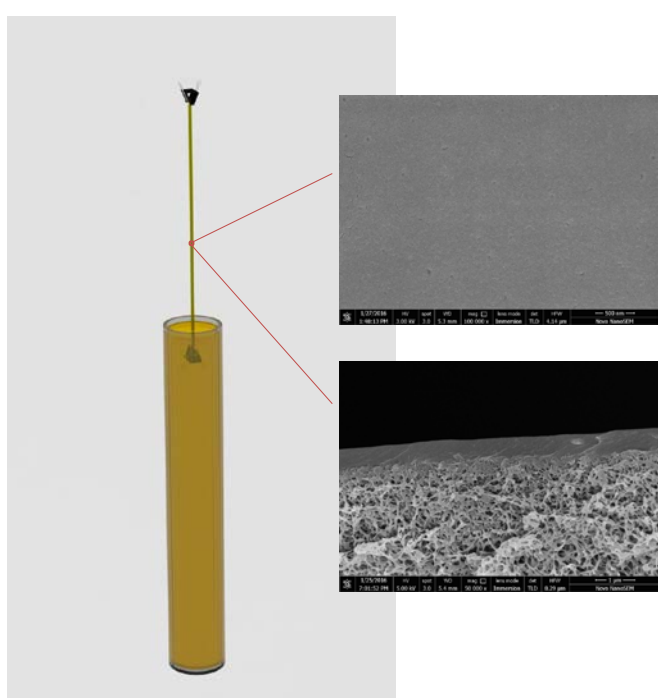
- Single-side modification by PDA/PEI for Janus membrane;
- Improved MD flux without compromising the salt rejection;
- High salt rejection (99.7 %) for 10 g/L NaCl feed solution over long-term operation;
- Superhydrophobic membrane modification for complex brine treatment;

Operational optimization with crystallizer, transverse vibration and feed aeration

- Transverse vibration and feed aeration improve mass transfer;
- Crystallizer, vibration and aeration delay crystal formation on membrane;
- Suitable for the treatment of inland brine water and complex salty water.



Highly concentrated brine treatment by pervaporation



- Apply temperature difference across membrane to drive the dissolution-diffusion of water through the membrane;
- Scalable dip-coating technique to fabricate a thin PVA coating on PVDF support;
- Capable of highly concentrated brine desalination (200 g/L NaCl) with 100 % salt rejection;
- Excellent anti-fouling property in the presence of humic acid.