

Supplementary Information File

Development of hydrogen bonding stabilized conjugated carbonaceous polyaryl organic solvent nanofiltration membranes for molecular sieving

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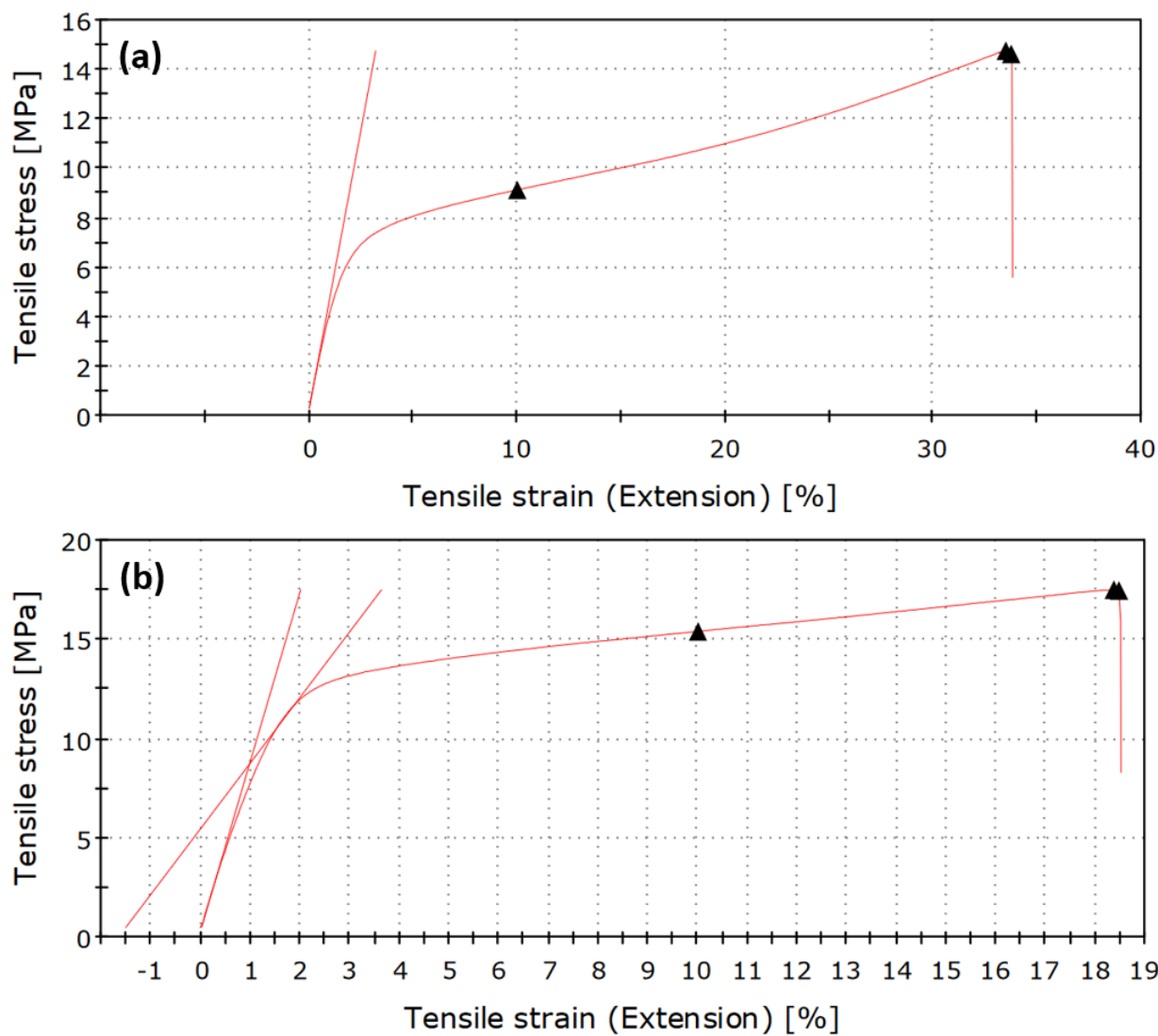


Figure S1: Stress-Strain curve of (a) PPy@H-PAN/PETP and (b) PPy@C-PAN/PETP membranes.

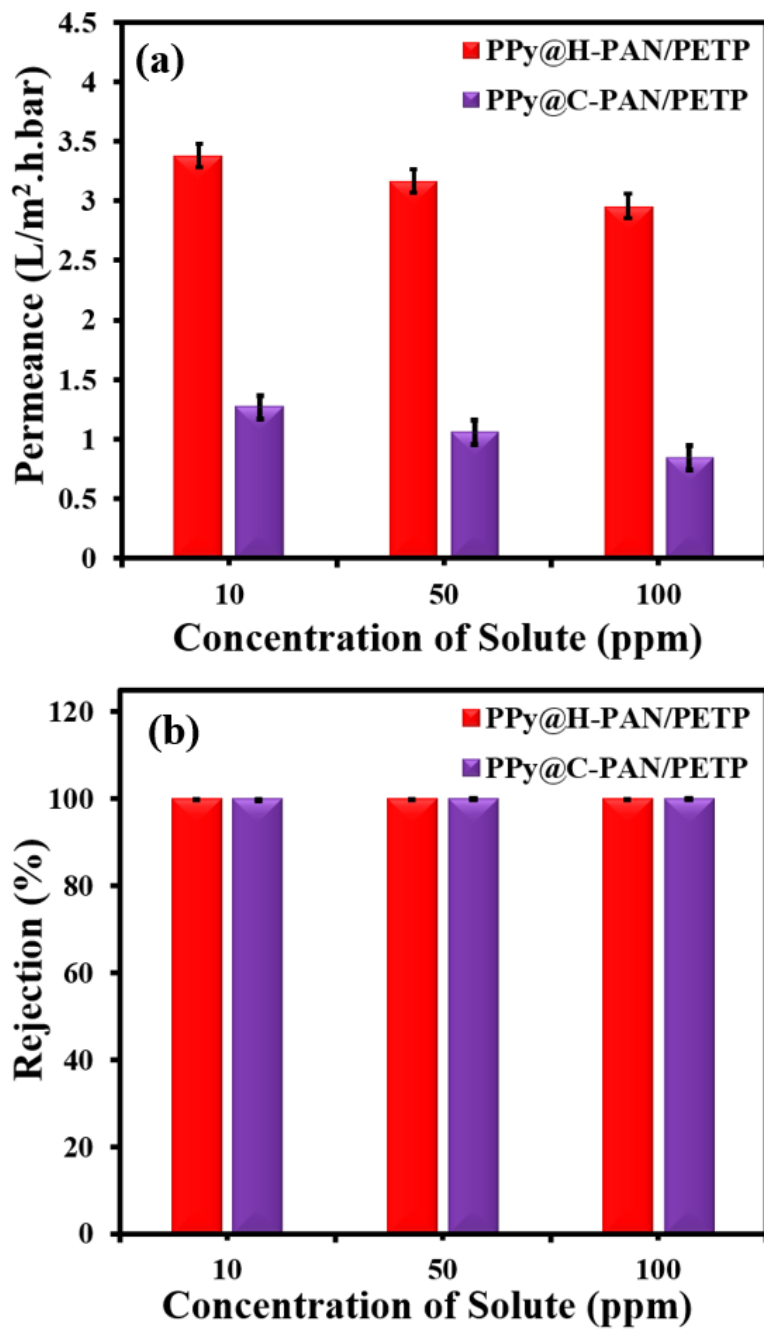


Figure S2: Effect of solute concentration on (a) Permeance and (b) % Rejection using EBT as a model solute dissolved in methanol.

Table S1: The green advances of hydrogen bonding stabilized conjugated carbonaceous polyaryl OSN membranes fabrication method compared to the state-of-the-art OSN membranes fabrication methods.

| S. No. | OSN membrane fabrication methods | Impact | |
|--------|---|--|------------------|
| 1 | Interfacial Polymerization (IP) Method | <ul style="list-style-type: none"> • IP process uses some toxic solvents such as n-hexane which is a well-known neurotoxic chemical used as an organic phase during IP. • Because of the toxicity caused by n-hexane, certain special arrangements are required for their use in the fabrication process. • n-Hexane is not only neurotoxic but also a highly volatile and flammable solvent which poses a huge threat to the membrane fabrication facility and workers. • The reaction between aqueous amine and organic acid chloride used during IP is highly abrupt and generates HCl as a by-product. • To keep the HCl from quenching the amino groups of the aqueous amine solution, the generated HCl is neutralized through the addition of organic or inorganic bases during IP. • Different types of organic bases such as triethylamine (TEA) and diisopropyl ethylamine (DIPEA) called Hunig's base are used in certain quantities in the aqueous amine solution. These bases are not green. • Due to the abrupt nature of the reaction between amine and acid chloride, the control over IP becomes difficult which requires extensive optimization to generate an active layer of desired thickness and morphology of the active player. | 1-6 |
| 5 | In-situ Oxidative Polymerization Method | <ul style="list-style-type: none"> • A green strategy for developing an OSN membrane making use of these secondary forces of attractions which can be readily scaled up to a commercial | This Work |

| | | | |
|--|--|--|--|
| | | <p>level and is a cost-effective approach with a less environmental hazard.</p> <ul style="list-style-type: none"> • Oxidative polymerization of an aqueous solution of pyrrole monomer in the presence of FeCl₃ was able to deposit a dense conjugated carbonaceous polyaryl active layer on the UF PAN support resulting in OSN/SRNF membranes. • This approach uses a greener reaction medium based on water for growing the active layer compared to the IP process where n-hexane is generally used as an organic phase whereas the aqueous phase contains toxic organic bases such as triethyl amine (TEA), and diisopropyl ethylamine (DIPEA). • This approach of fabricating TFC membranes for OSN is a step forward in this dimension to enable the researchers to explore the vast field of polymerization to develop suitable and desirable polymeric active layers by making use of cost-efficient, environmentally benign, and scalable polymers. • Less environmental footprint and lower energy consumption. • Minimal hazard to the ecosystem. | |
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