

Thin film composite (TFC) anion exchange membranes for vanadium FB

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1 Introduction & design



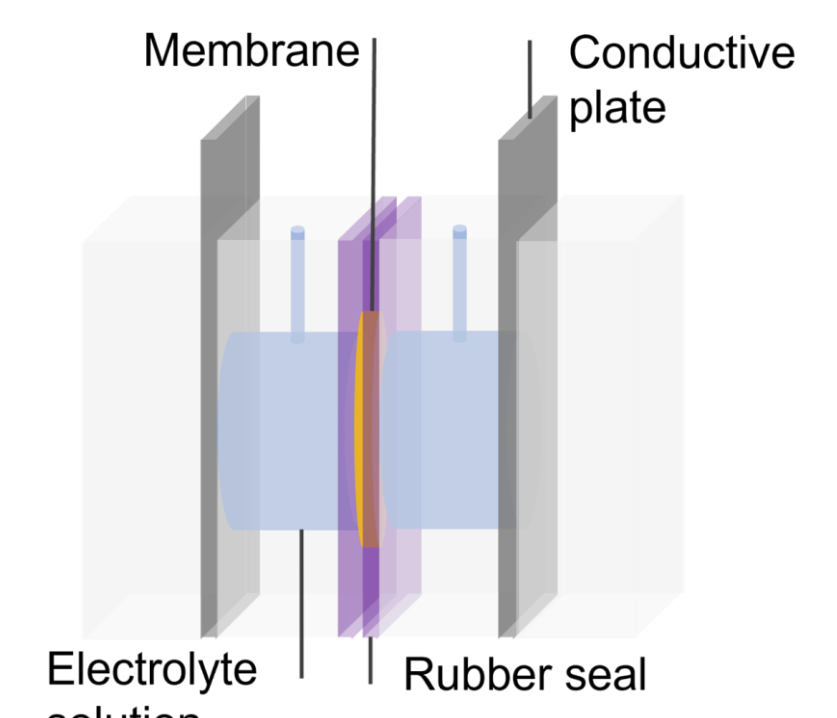
TFC-membranes can break the trade-off between permeability and conductivity seen in traditional dense membranes.

TFC-membranes should contain and are designed for:

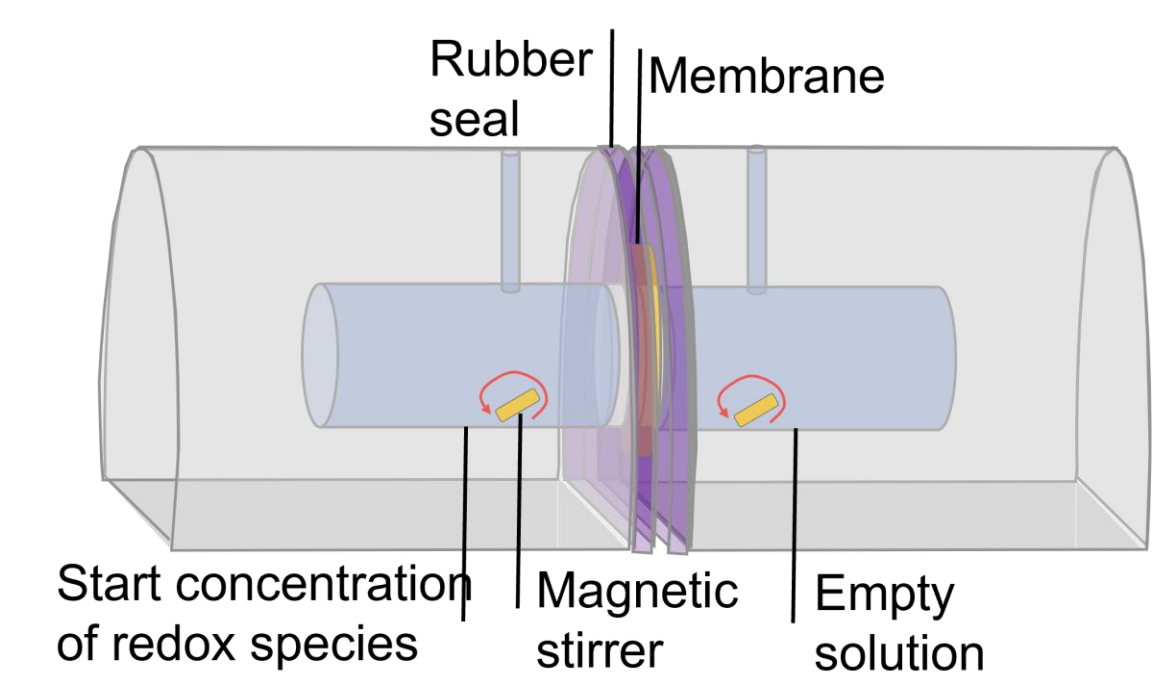
- Low resistance support
- Selective top layer
- Stable properties

2 Characterisation methods

Impedance spectroscopy with lab-made resistance cell:

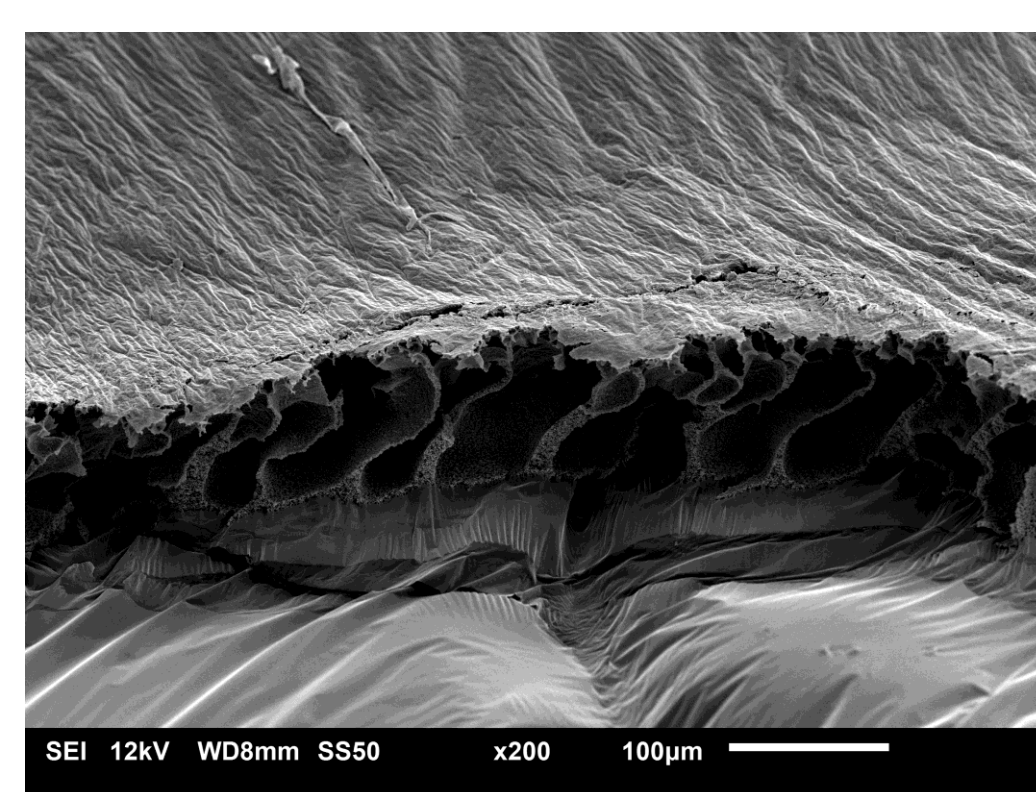
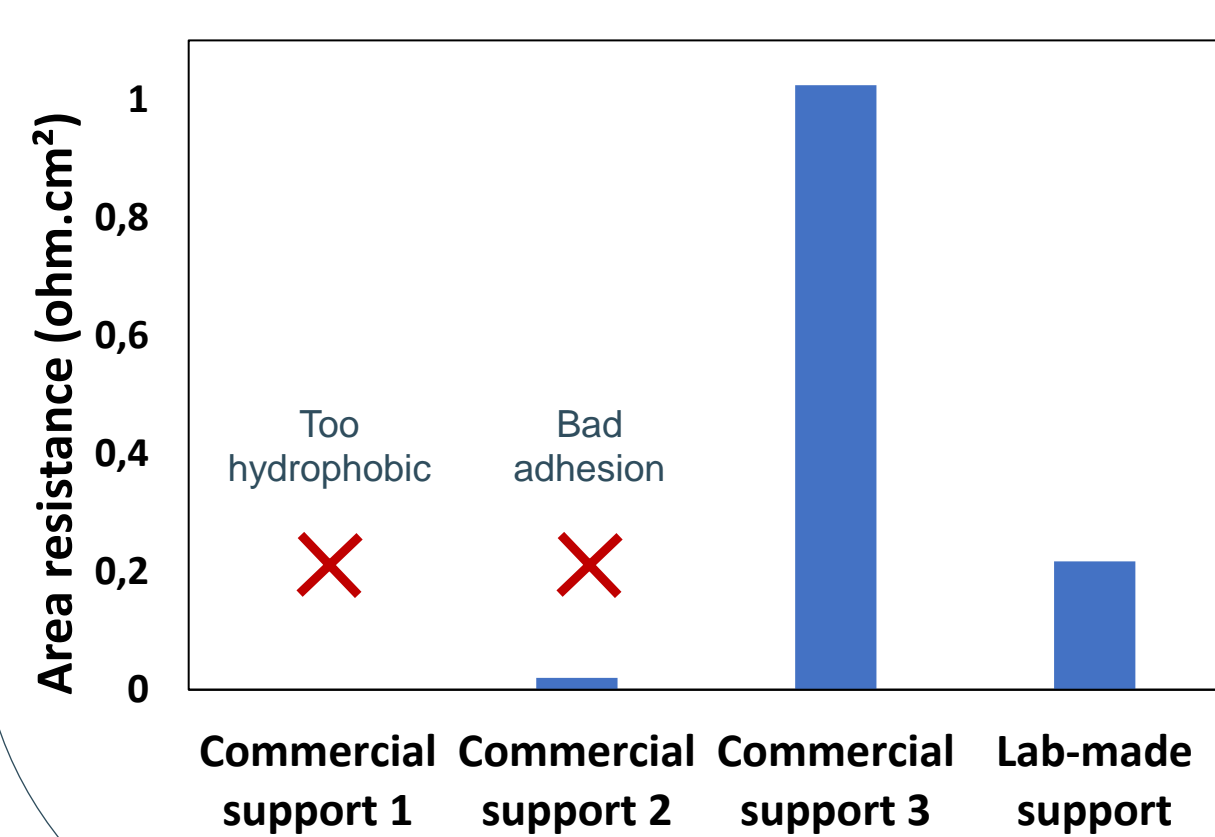


Crossover experiment with lab-made diffusion cell:



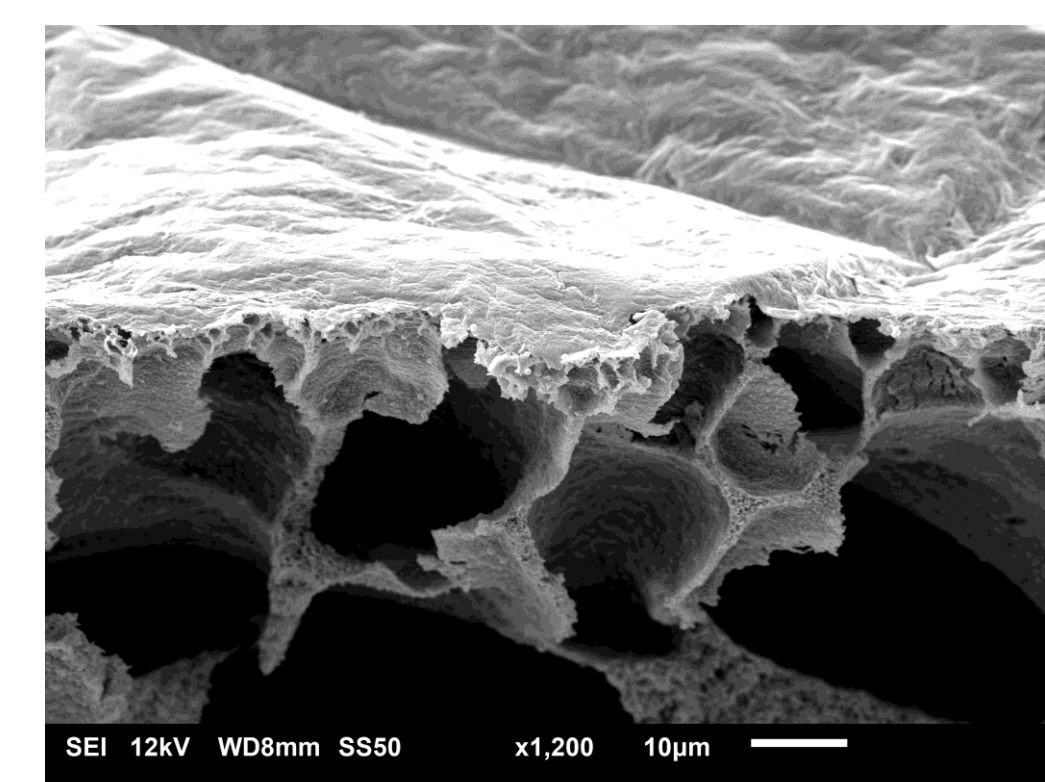
3 Support results

- Several commercial membranes were tested as support
- Lab-made support optimization for resistance and integrity of top layer
- Lab-made support shows best results: adhesion & low resistance thanks to open structure



4 Top layer results

- Temperature ↑ 😊
- Additional synthesis steps: mixed results based on reagents and time: no effect on long-chain; detrimental effect on short-chain at long times; positive effect on short-chain at short times
- Short-chain reagents more selective than long-chain reagents
- Stable in extreme pH (0-14)



5 Conclusion

- Trade-off still exists within one type of TFC, but material choices allow shift.
- Recent material choices and synthesis conditions have led to a **very minimal trade-off**.

Long-chain reagent on lab-made support

Short-chain reagent on lab-made support with additional synthesis step

Short-chain reagent on lab-made support

Long-chain reagent on commercial support

