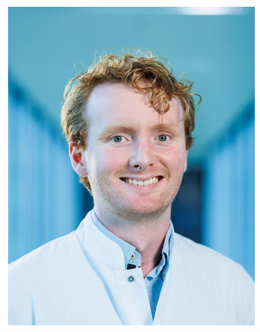
WP4.1 – Outside-In Polyelectrolyte multilayer membranes

Tjerk R. Watt; Esra te Brinke; Joris de Grooth; Wiebe M. de Vos
t.r.watt@utwente.nl



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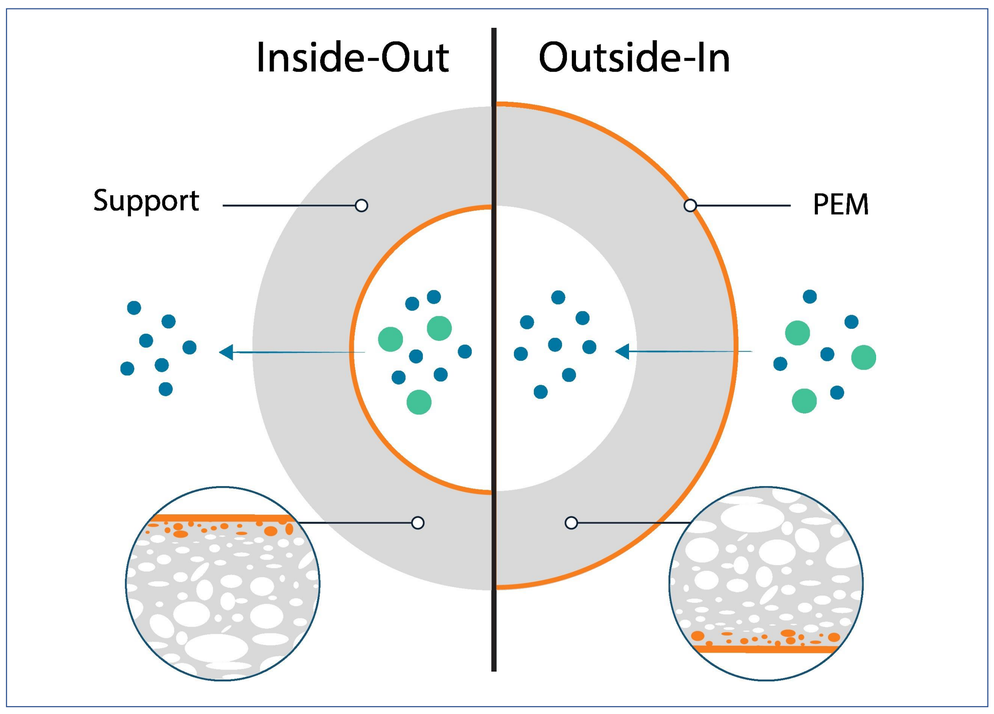
Research objective

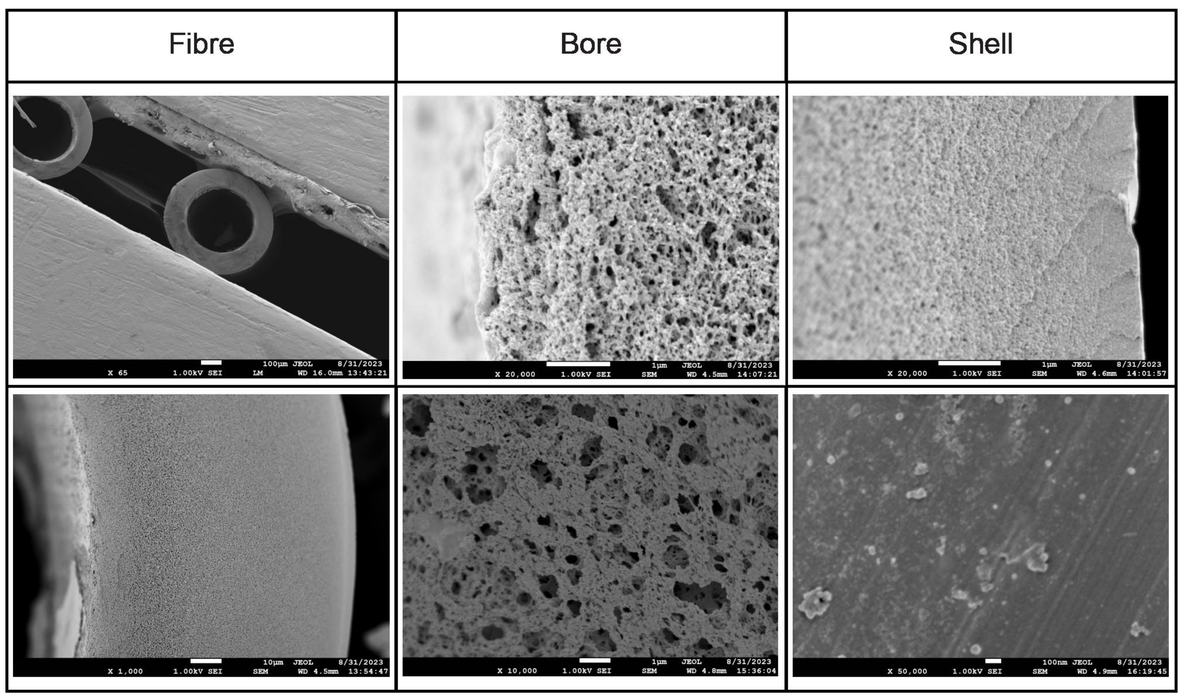


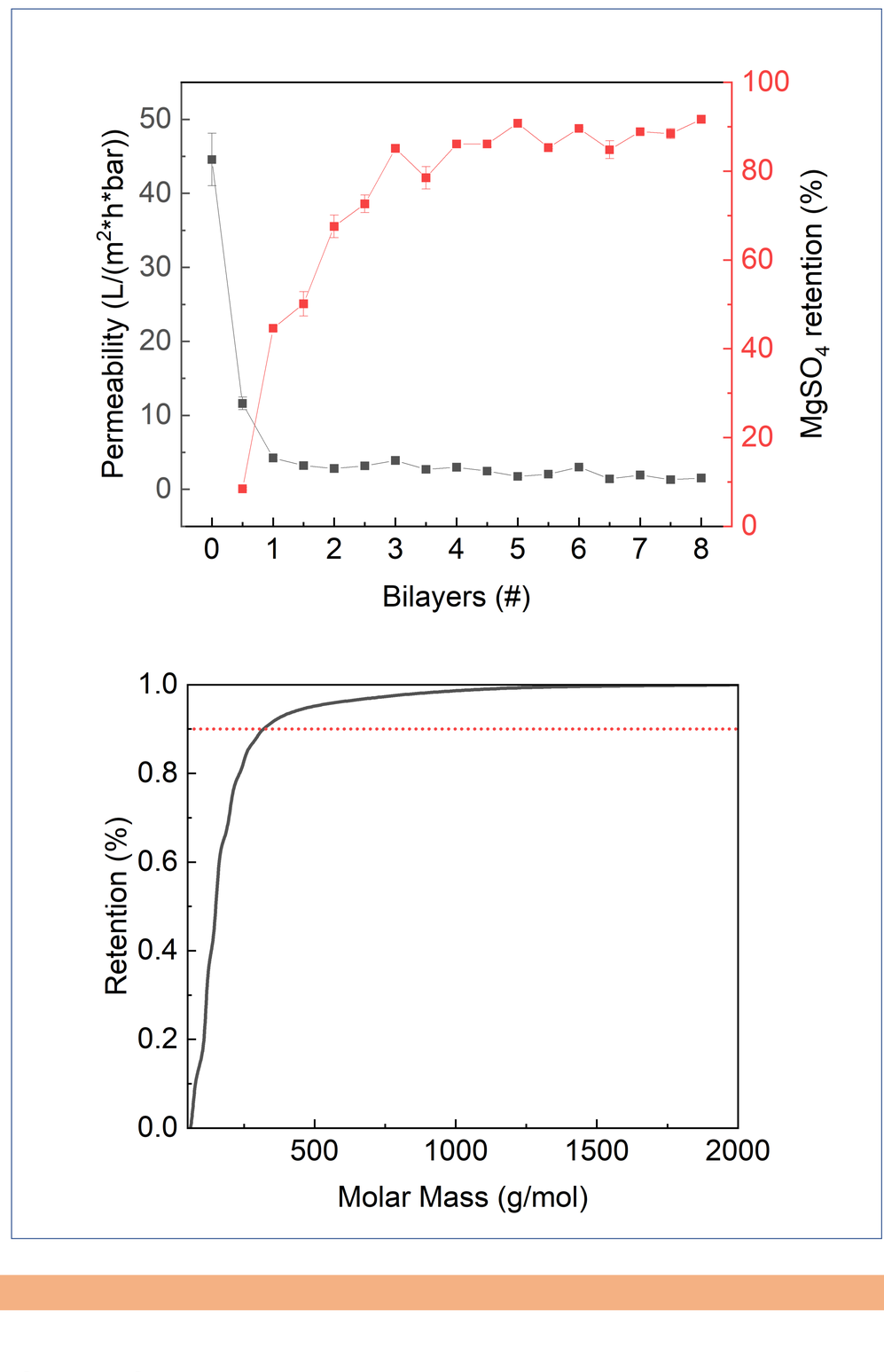
Research goal: Fabricate the first Outer-skinned polyelectrolyte multilayer membranes (PEMM)

Advantages Outside-In over Inside-Out:
- Increase in active surface area per module → By up to 5x
- Smaller fibres can be fabricated → Increase in mechanical strength leading to new possible applications
- New module designs possible limiting concentration polarization → better (micro)pollutant retentions

Results

- Supports have been made with the desired outside-in type structure
- Fibres have been coated with PAH/PSS from a 500 mM NaCl solution
- Nanofiltration properties were obtained with a 90% $MgSO_4$ retention and 320 g/mol MWCO
- The permeability of the coated fibres is low at 3 L/(m^2*h*bar)
- Current surface area increase amounted to 3.5x





Future plans

- Increase polymer concentration to further improve mechanical strength of fibres
- Study resistance of polyelectrolyte multilayers to abrasion
- Study applicability for membranes in shell/Qatar case

Take-home message

- We were able to fabricate an outside-in PEMM
- Membranes show nanofiltration properties
- Outside-in PEMMs have the potential to increase the membrane surface area per module up to 5x

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