4TU. Energy

Membranes for Sustainable Energy and Chemical Manufacturing

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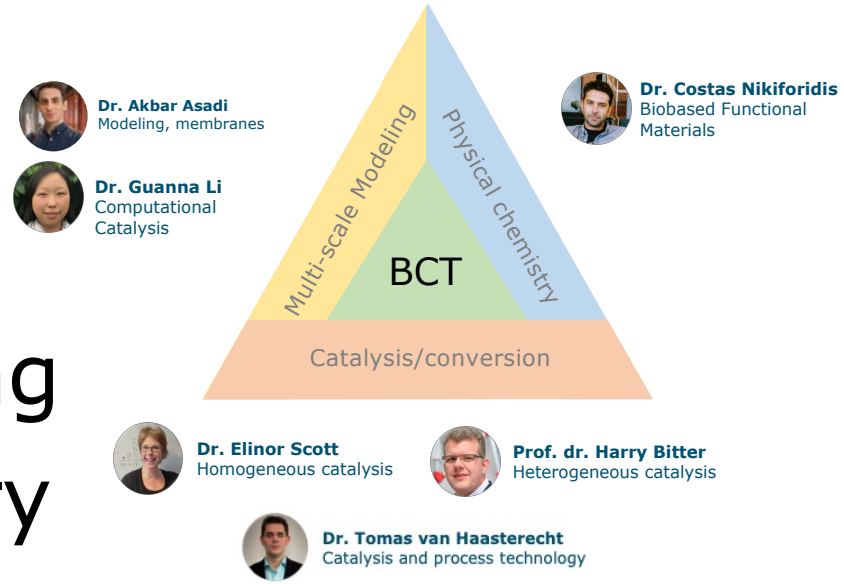
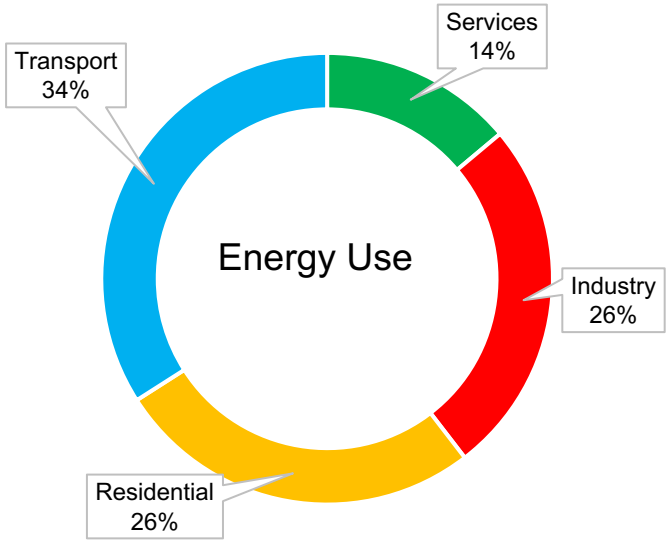
Wageningen University & Research

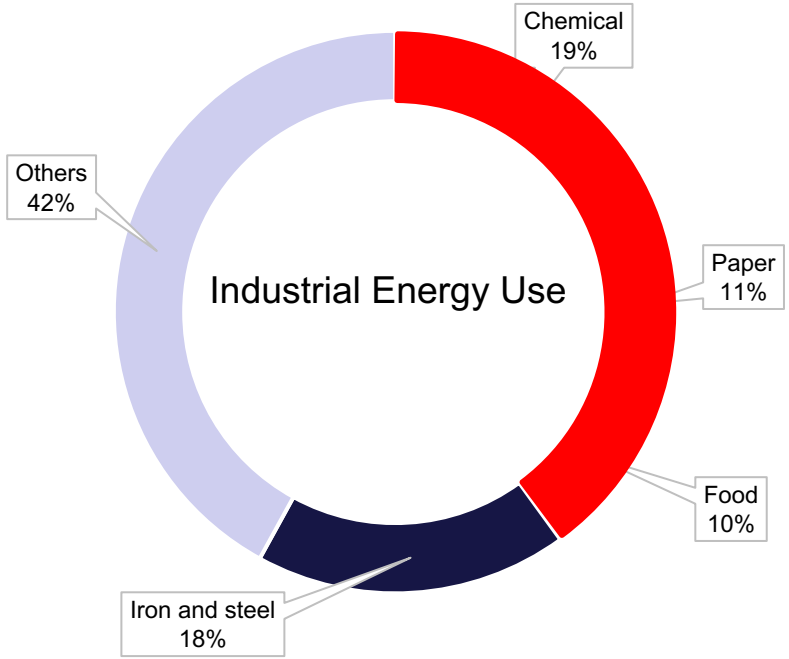
Biobased Chemistry and Technology

- Catalysis and Separation
- Multiscale Modelling
- Physical chemiustry



Energy Use in EU



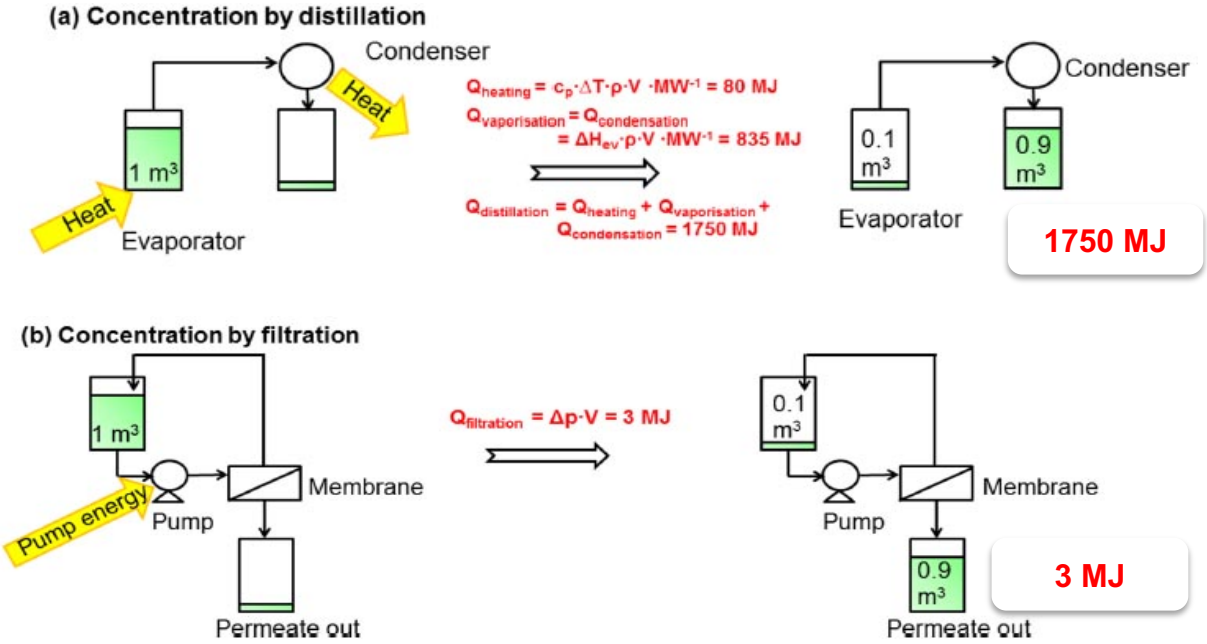


Current Status:

Separation is Energy Intensive

- Separation is vital in chemical industry
- Up to 70% of the cost
- 10 – 15% of the entire world energy use

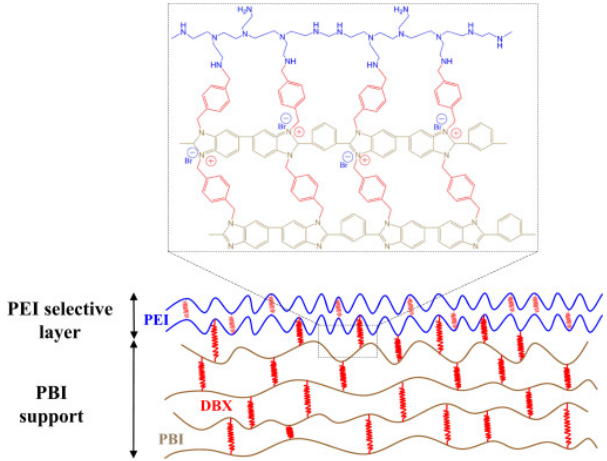
Advantage of Membranes

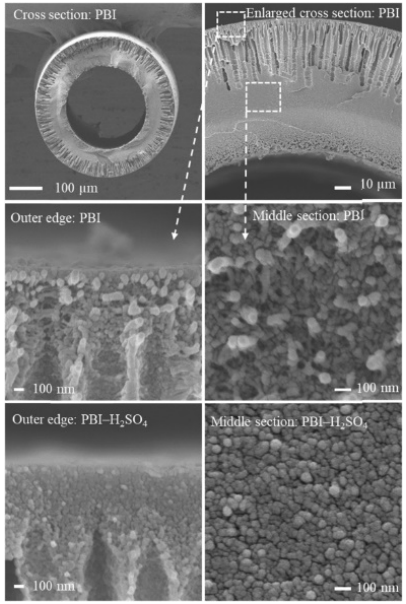


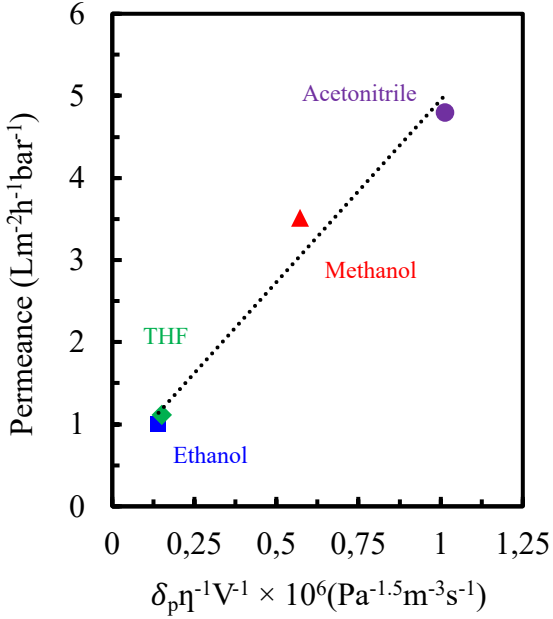
Chemical reviews 114.21 (2014): 10735-10806.

Robust Membranes:

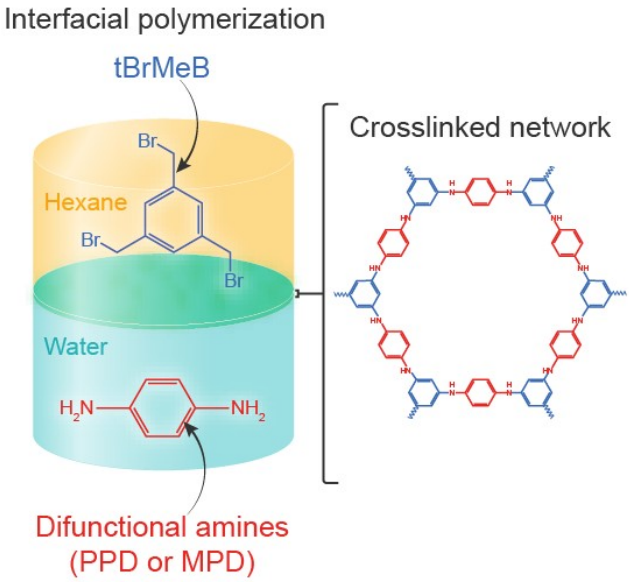
Solvent Resistant

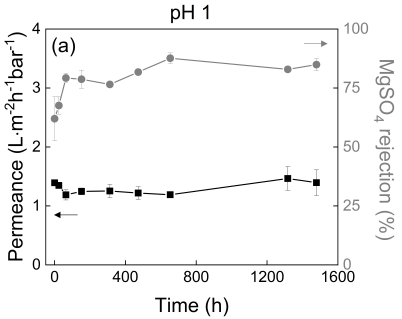


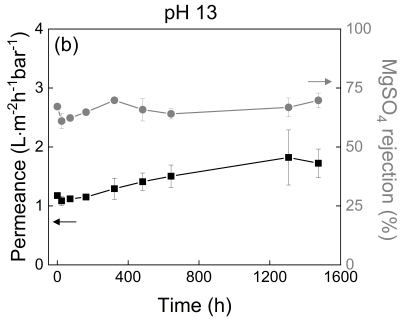


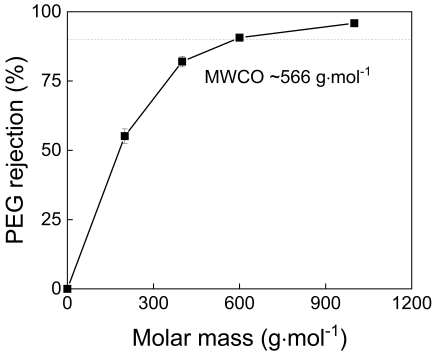


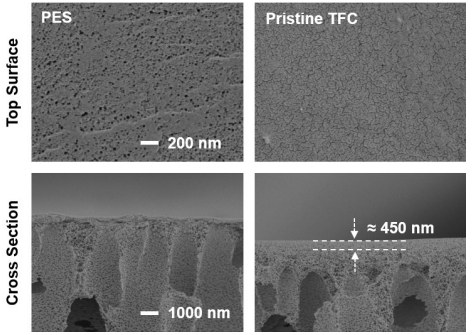
Selective Membranes





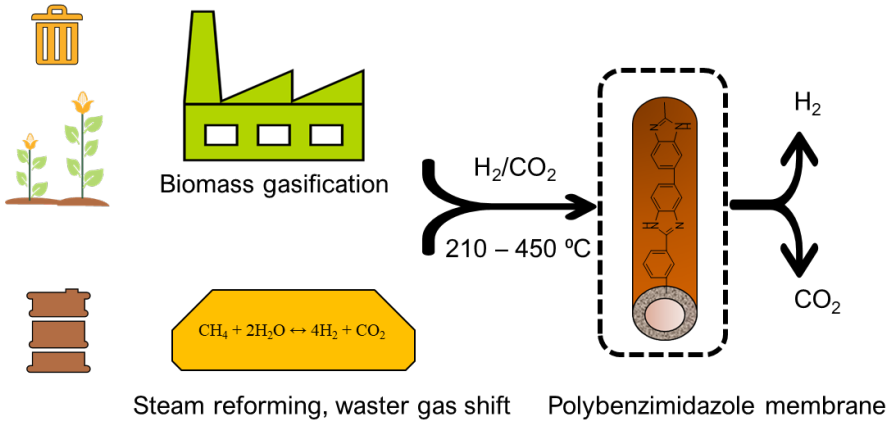


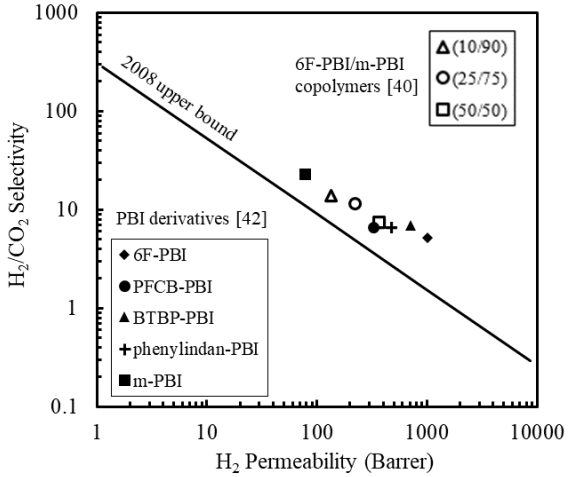




Robust Membranes:

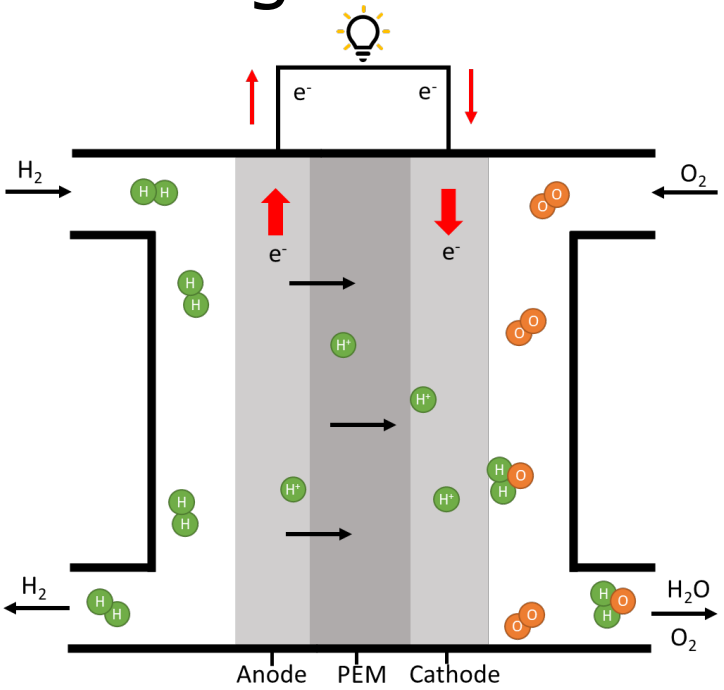
Gas Separation





Fuel Cell: Proton Exchange Membrane

- Nafion replacement
- High T
- Low H_2 crossover
- Conductivity



Conclusions

- Chemical industry is energy intensive and one of major GHG emitters
- Separation accounts for 70% of the costs
- Membranes offer green separation
- Membranes are essential for a hydrogen economy