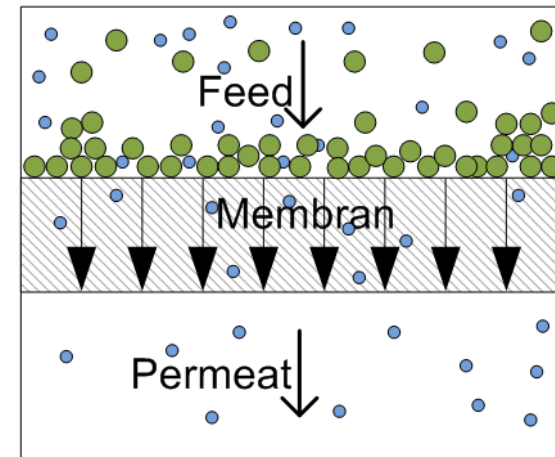


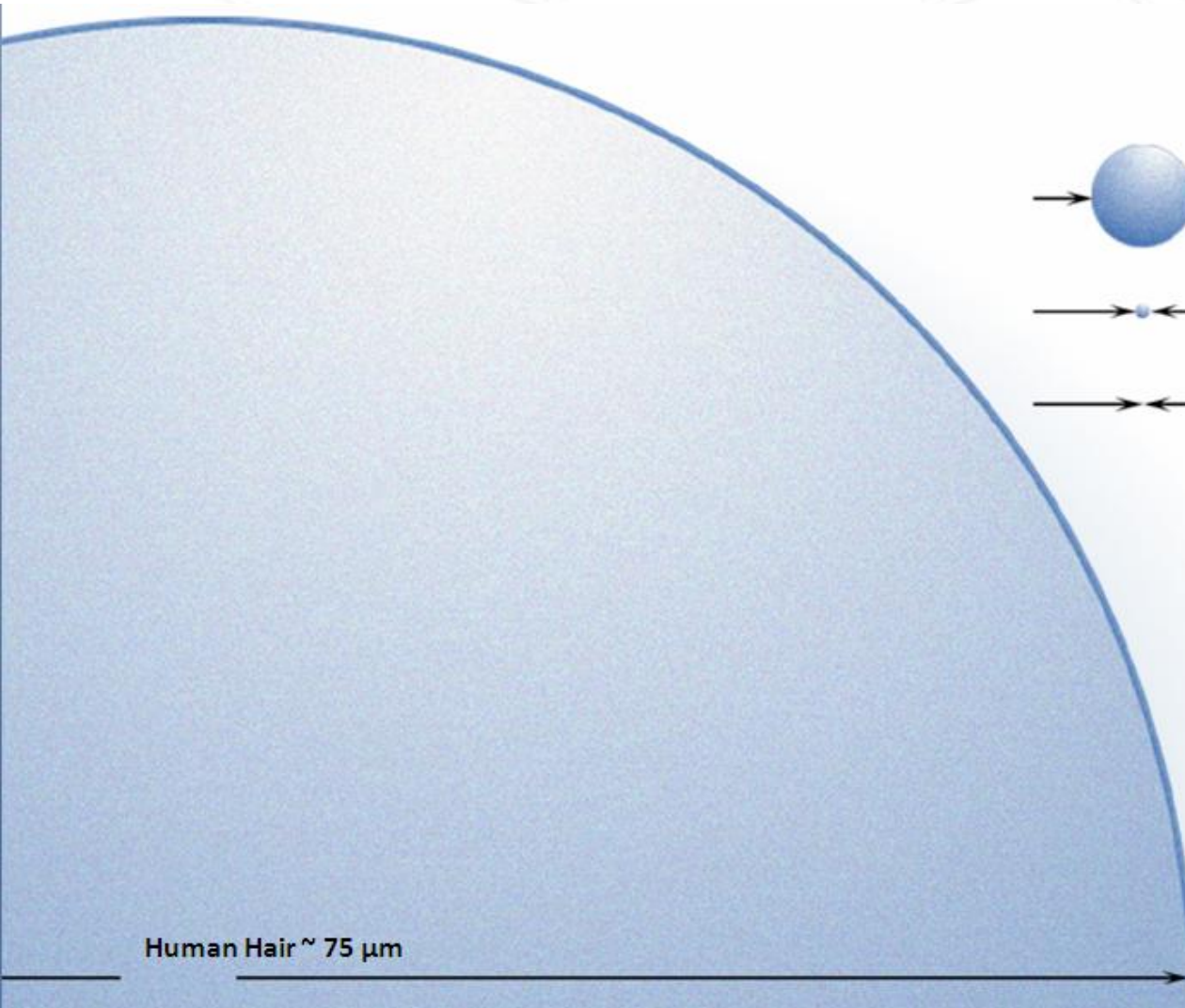
Herstellung von Multi- Channel- Kapillarmembrane

Membranfiltration?



Dead-end filtration





Yeast Cell = 3.00 μm

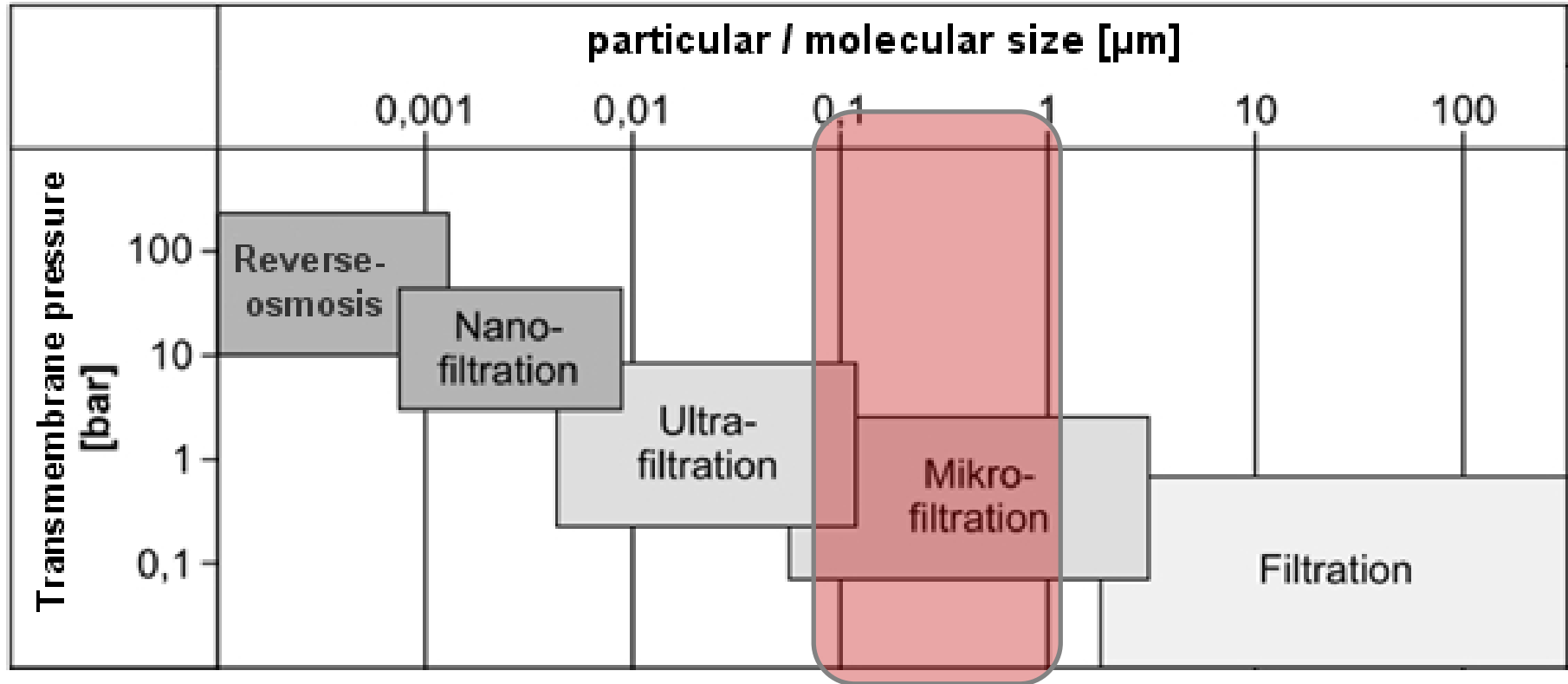


Bacteria = 0.45 μm



Iron Ion = 0.001 μm

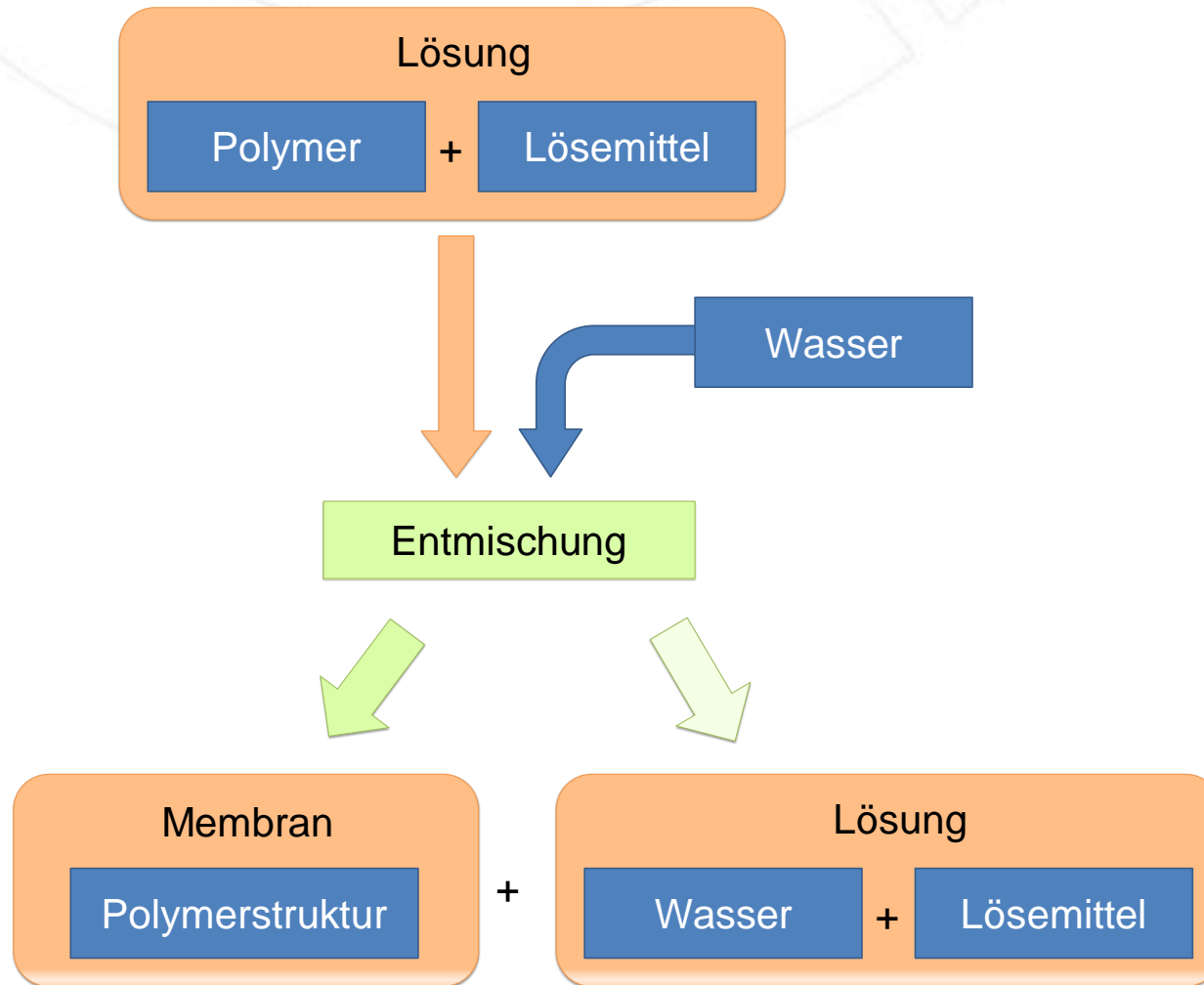
Human Hair \sim 75 μm

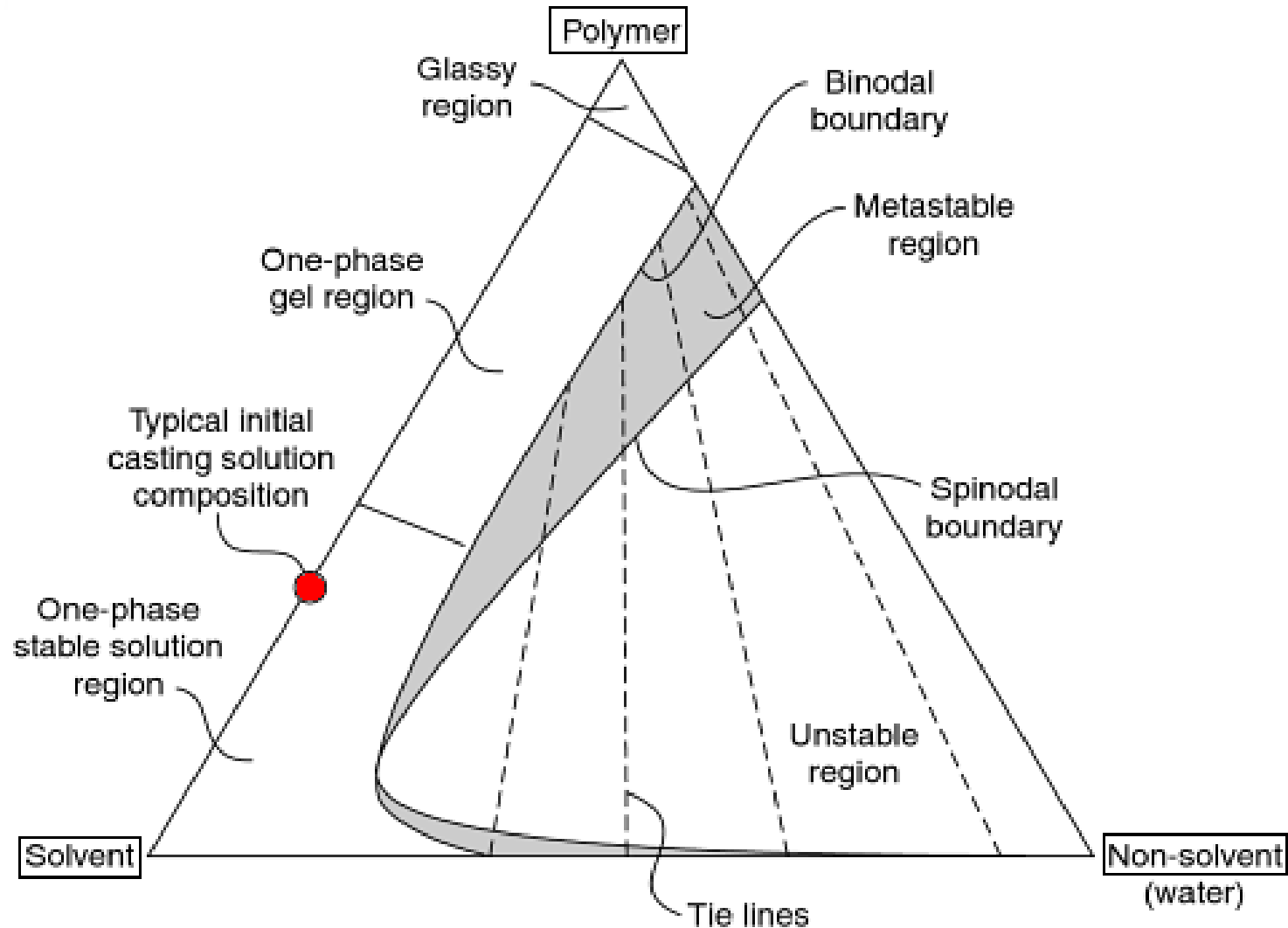


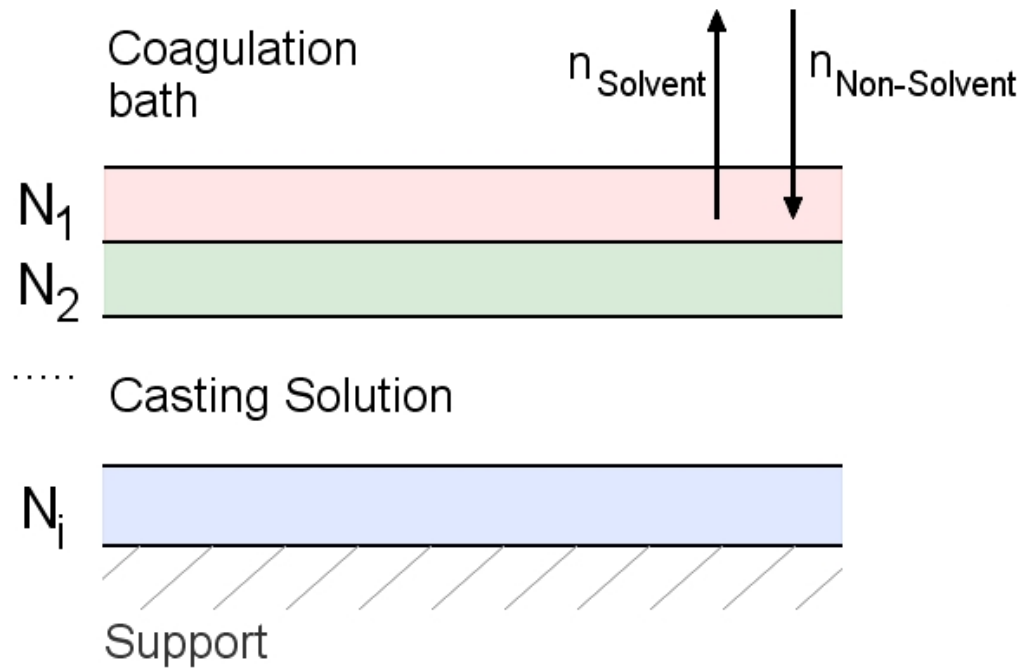
- Anorganisch:
 - *Keramik- od. Metallmembrane*
- Organisch:
 - *PSU - Polysulfone*
 - *PES - Polyethersulfone*
 - *PVDF - Polyvinylidenfluorid*
 - *PP - Polypropylene*
 - *PA – Polyamide*

Auswahlkriterien:

- *Kosten, Stabilität (mech., chem. und Temperatur), Handhabbarkeit*



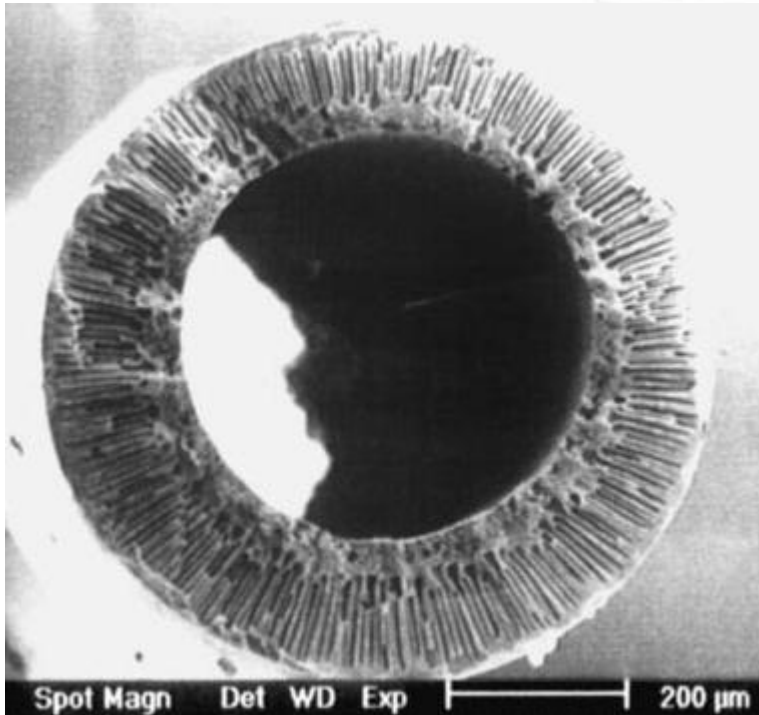




$$k = \frac{\vec{n}_{\text{Solvent}}}{\vec{n}_{\text{Non-Solvent}}}$$

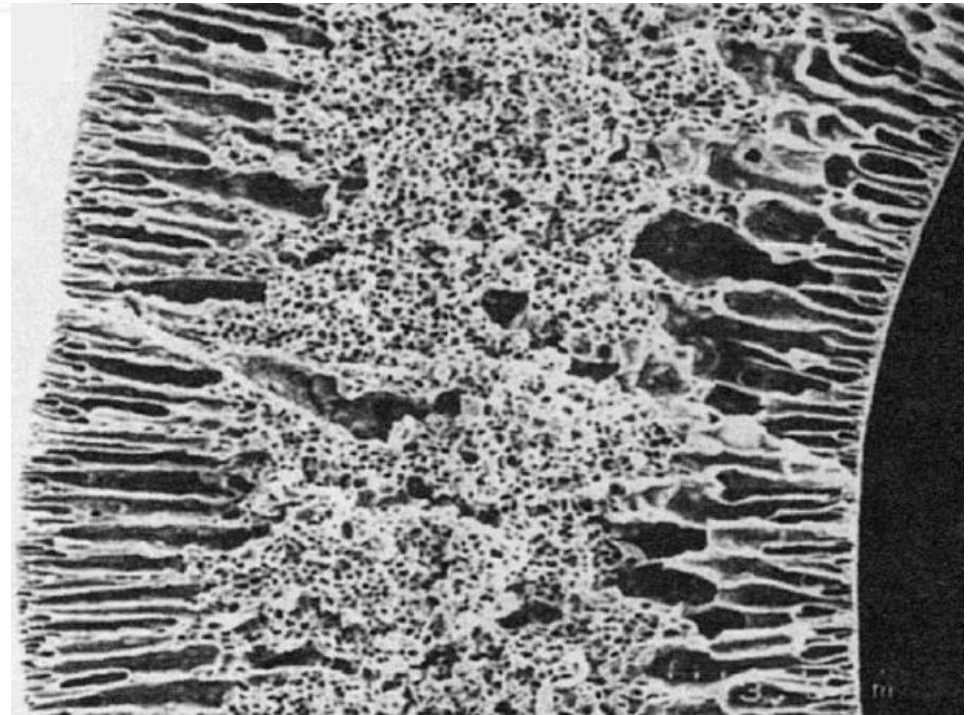
$$k_1 \neq k_2 \dots k_{i-1} \neq k_i$$

„finger – structure“



Journal of Membrane Science 157 (1999) 35-51

„sponge – structure“

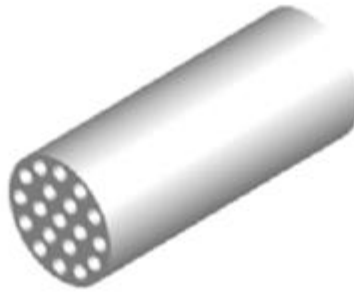


Journal of Membrane Science 150 (1998) 75-85

Rohrmembrane



$\varnothing_{out} = 10 \text{ mm}$
 $\varnothing_{in} = 7 \text{ mm}$



$\varnothing_{out} = 25,6 \text{ mm}$
 $\varnothing_{in} = 3,3 \text{ mm (19x)}$

Hohlfasermembrane

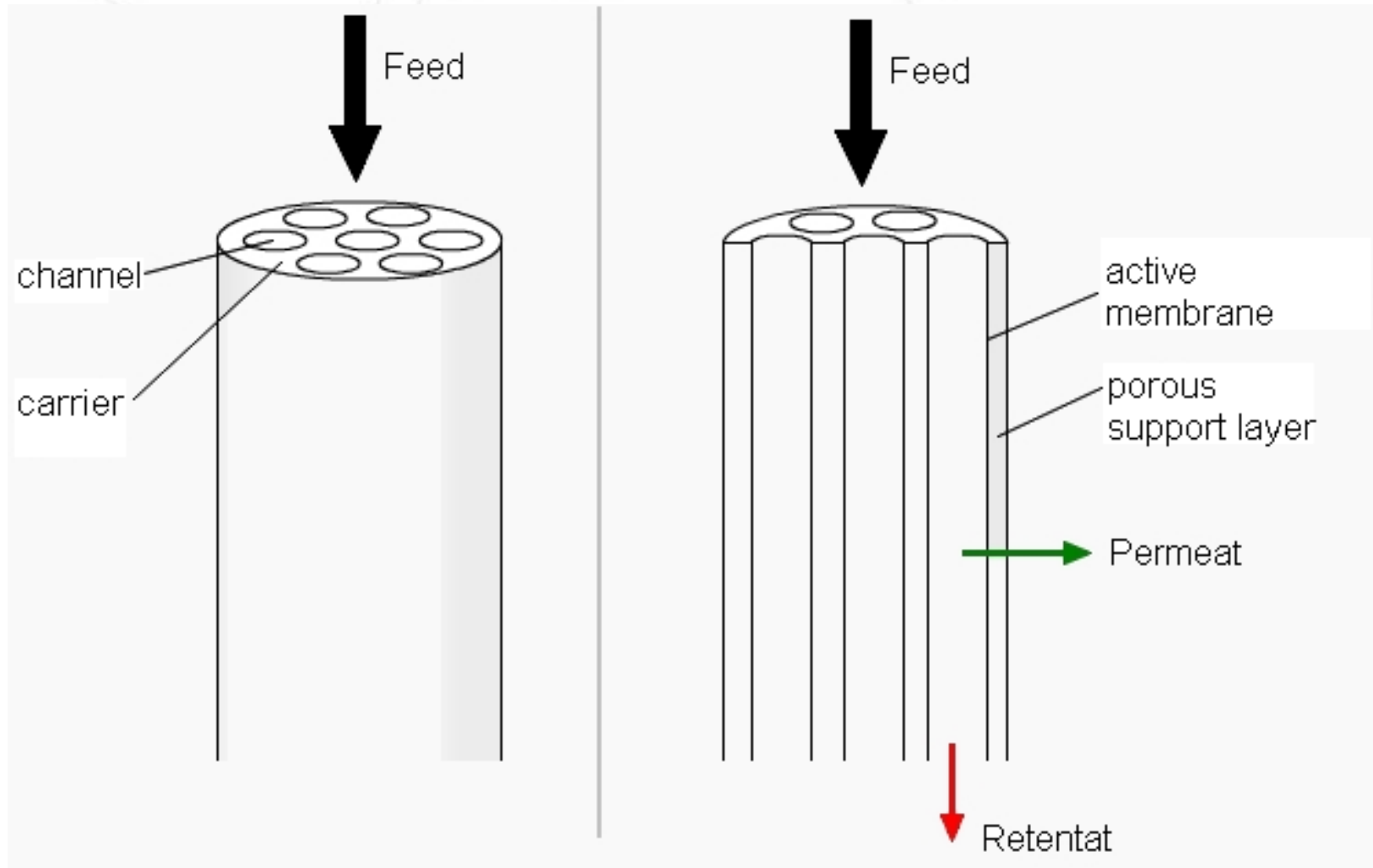


$\varnothing_{out} = 2 \text{ mm}$
 $\varnothing_{in} = 1,3 \text{ mm}$

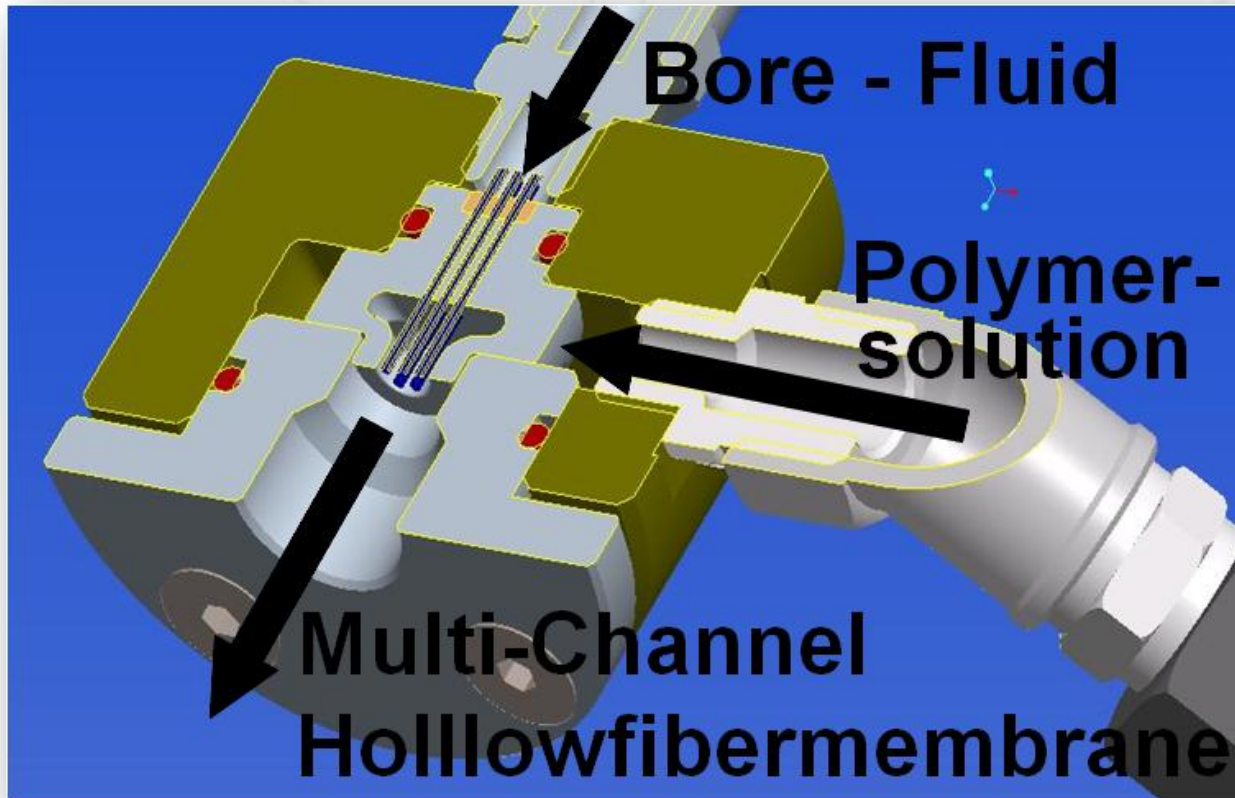


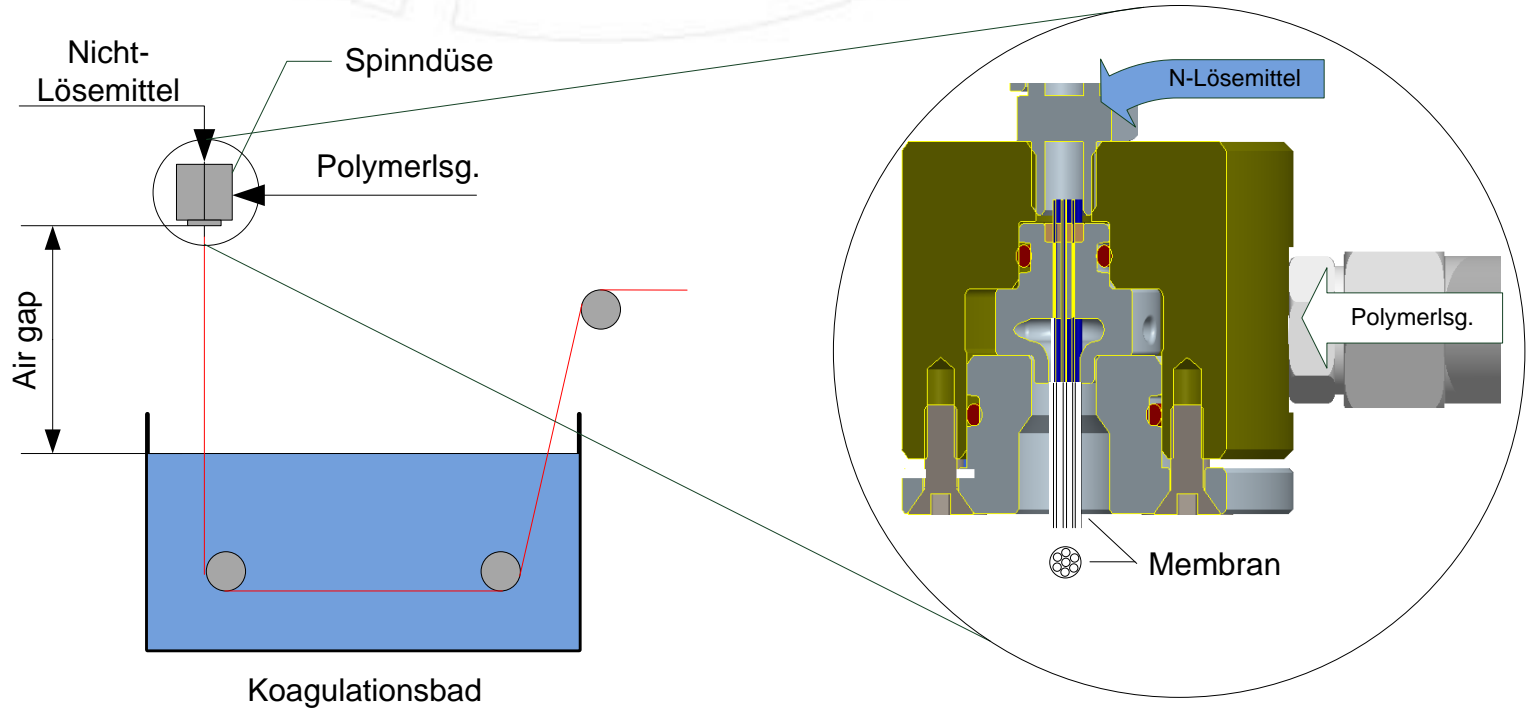
$\varnothing_{out} = 4 \text{ mm}$
 $\varnothing_{in} = 1 \text{ mm (7x)}$

	Material für 1 m ² Membranfläche	Packungsdichte
Single - Channel Tubular Membrane	1,82 Liters	280 m ² /m ³
Multi - Channel Tubular Membrane	1,79 Liters	383 m ² /m ³
Single - Channel Hollowfiber Membrane	0,44 Liters	1300 m ² /m ³
Multi - Channel Hollowfiber Membrane	0,32 Liters	1750 m²/m³

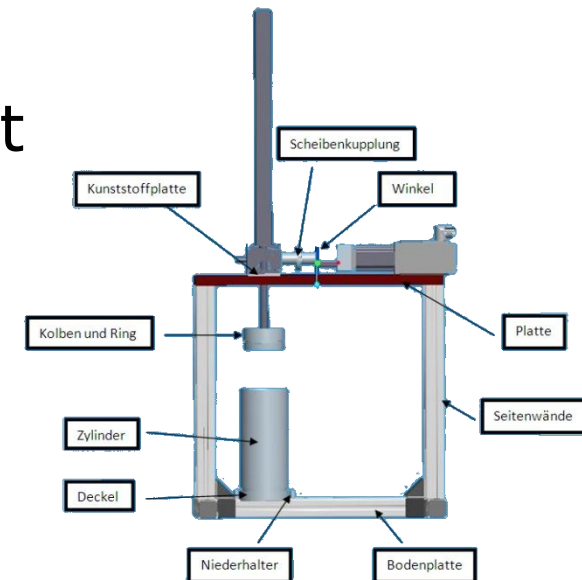


Multi-Channel Membrane

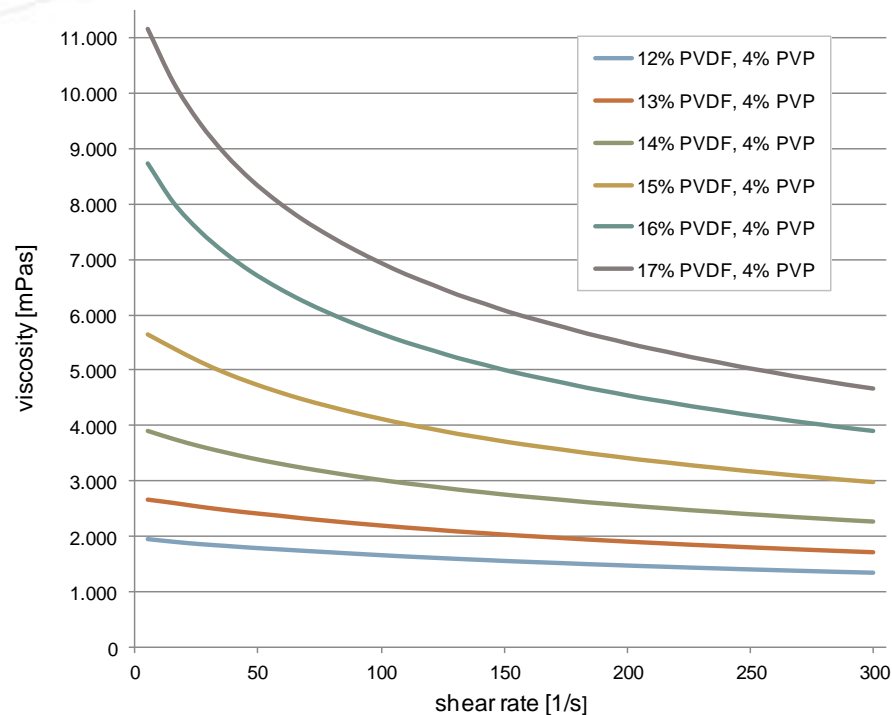
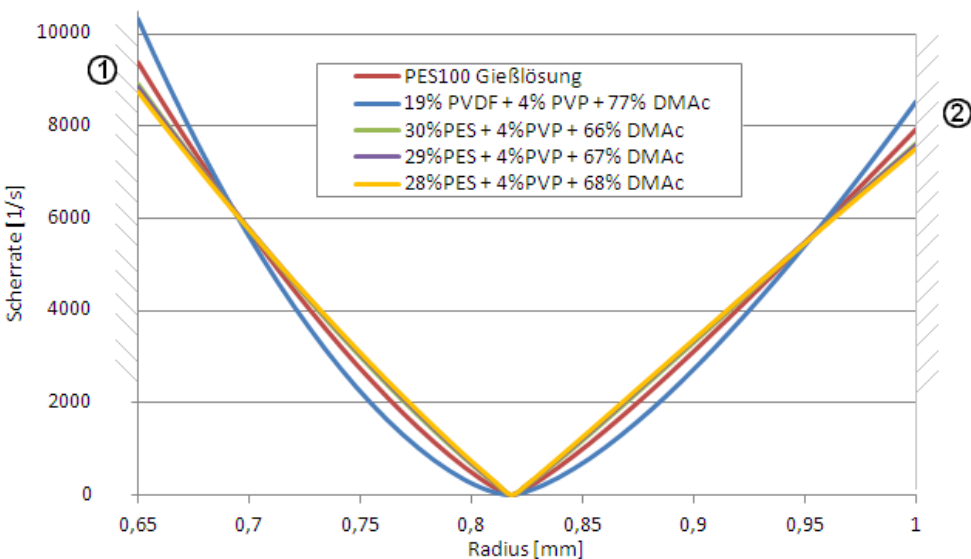
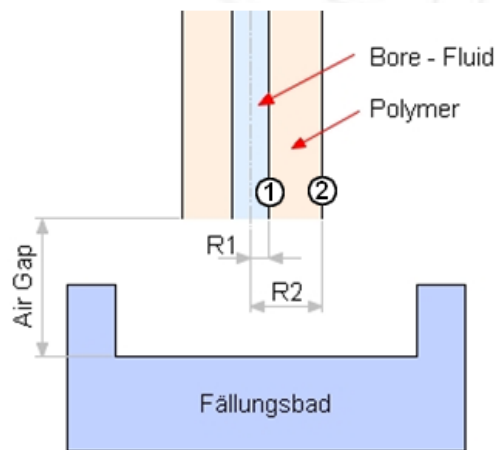




- Solvent / Non-Solvent – System
- Polymerkonzentration
- Additive (z.B. org. Materialien, Nanopartikel)
- Temperaturen (Dope, Fällbad, etc.)
- Zusammensetzung des Non-Solvent
- Spinnparameter
 - Polymerfluss (WICHTIG: pulsationsfrei)
 - air gap, etc.

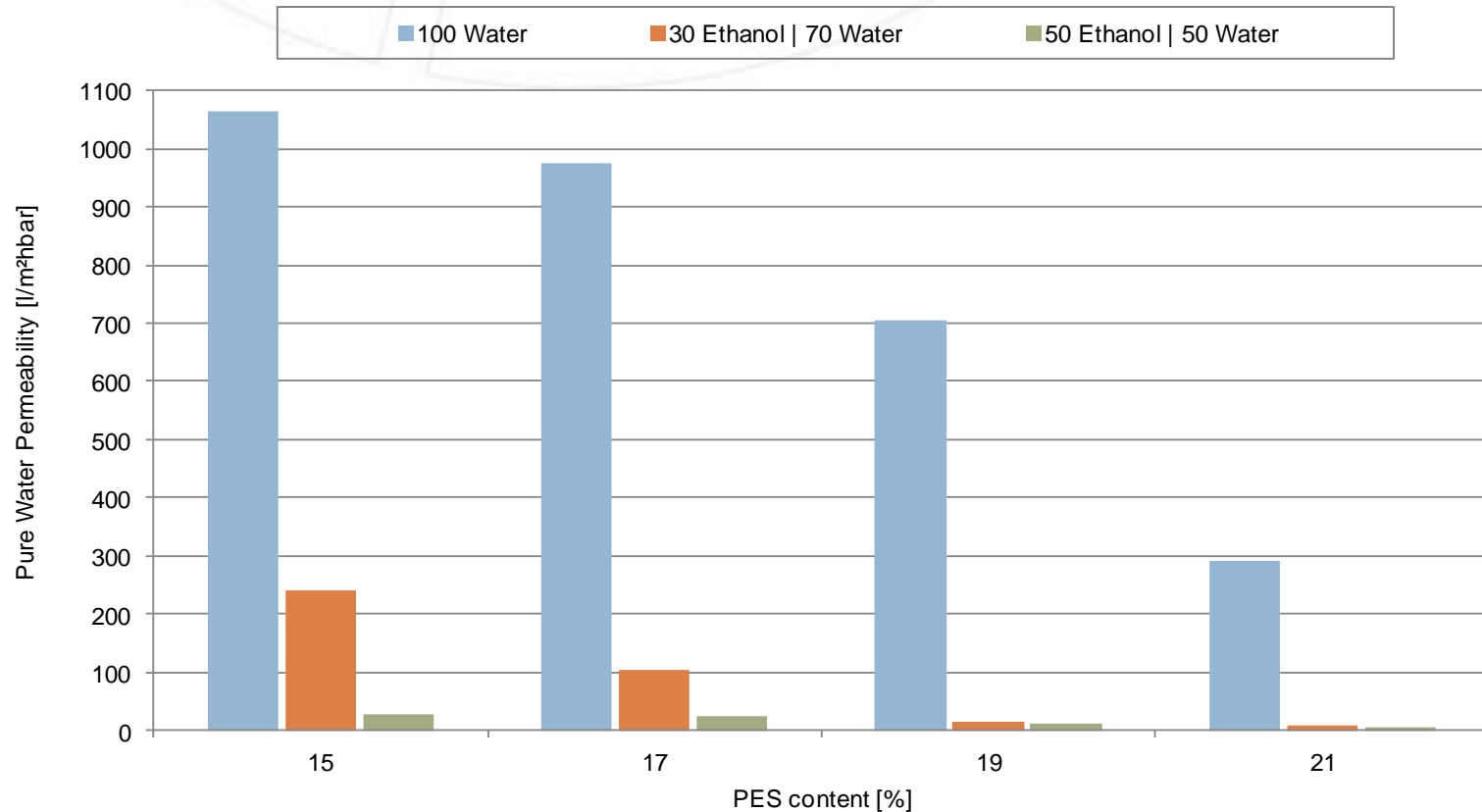


Einfluss der Viskosität



Berechnet nach Shilton, S., J.; J. Appl. Polym. Sci. **65**, (1997) 1359

Polymerkonzentration



Einfluss des Non-Solvents

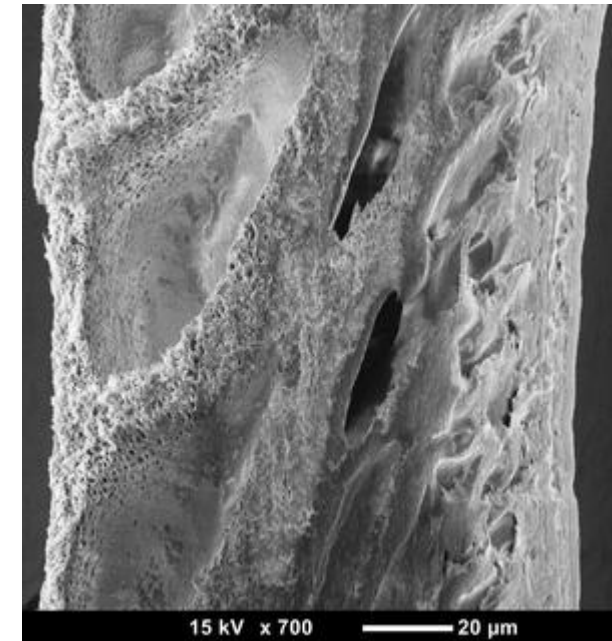
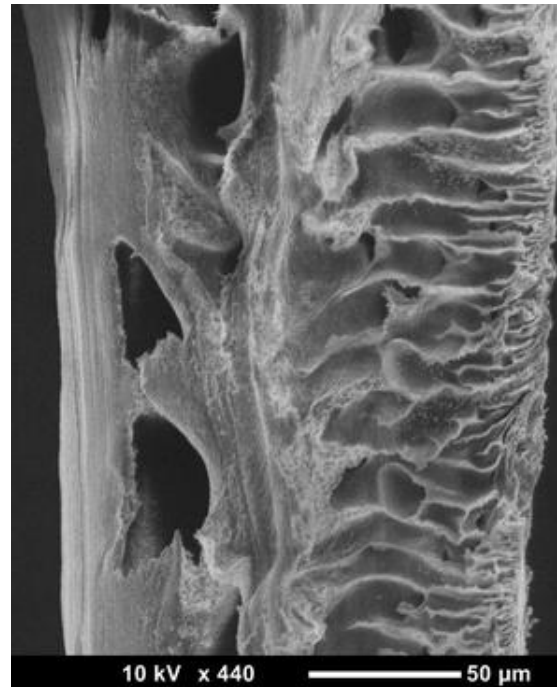
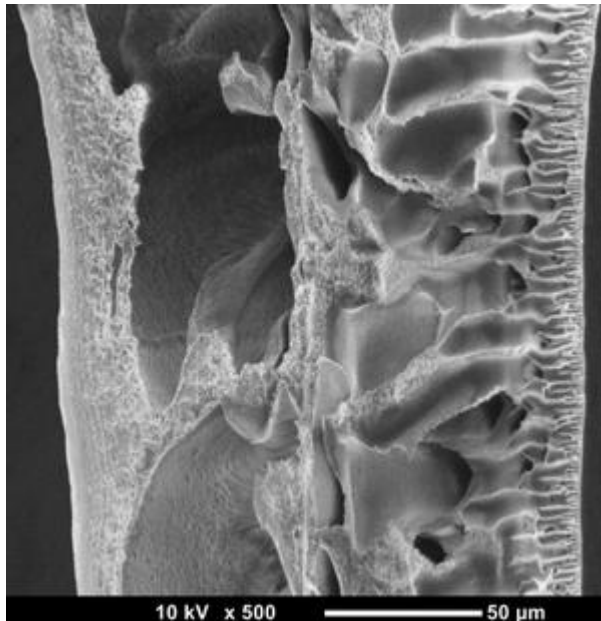
17% PES

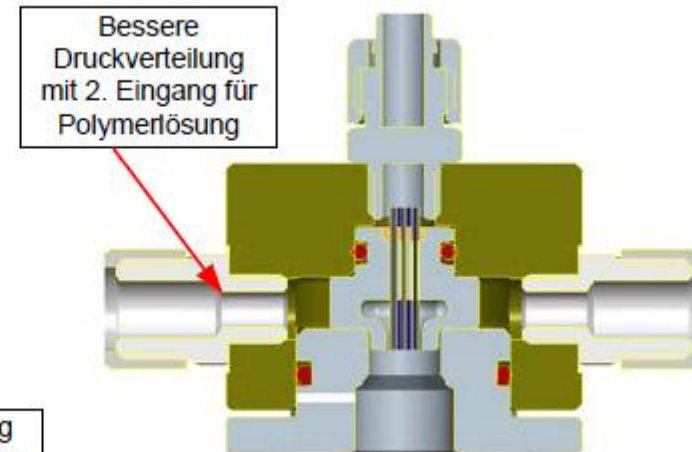
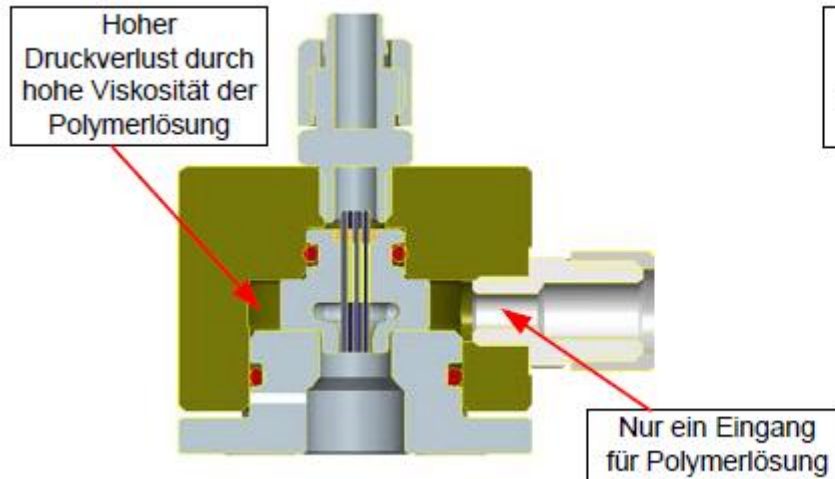
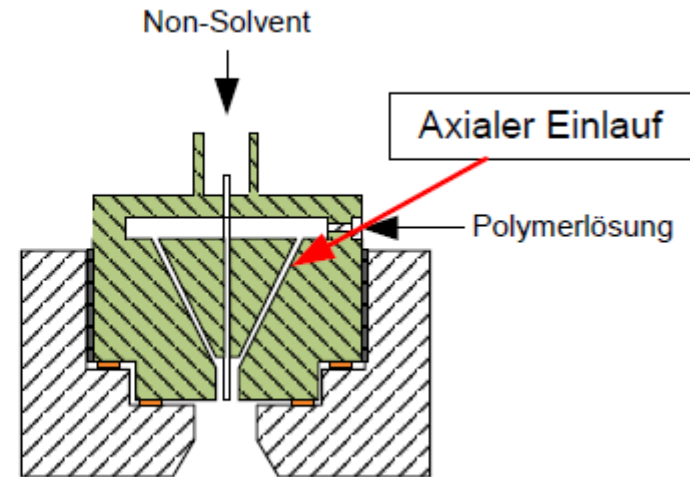
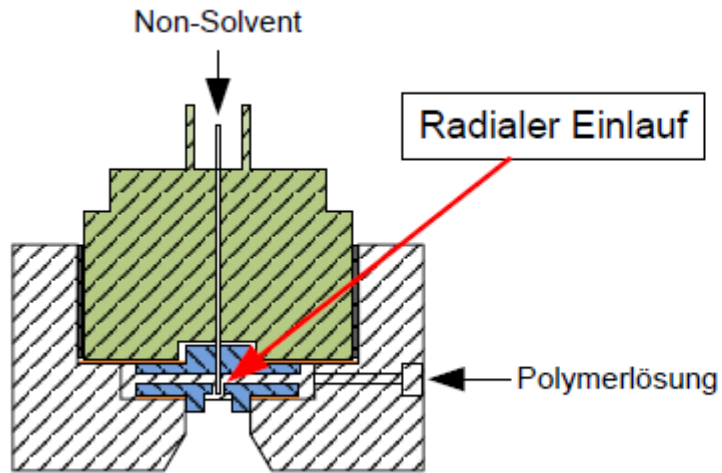
T = 20°C

100 Water

30 Ethanol | 70 Water

50 Ethanol | 50 Water





Mitwirkende

MCI:

- Marco Rupprich
- Martin Spruck
- Thomas Obhlozer
- Gregor Fili
- Gregor Höfer
- Etliche Studierende



HTL-Fulpmes

- Martin Schmidt-Baldassari
 - Kurt Gremminger
 - Mathias Trenkwalder
 - Dominik Ritter
 - Dominik Gleinser
 - Alexander Ruech
-
- Aktuell 4 exp. HTL-DA in 2 Projektabschnitte



...ein Projekt durchgeführt im Rahmen des Förderprogramms Sparkling Science, gefördert vom Bundesministerium für Wissenschaft und Forschung

- Sieger des **Be-the-Best Awards** 2010 der WKO-Tirol (Dominik Gleinser und Alexander Ruech)
- Sieger des **Be-the-Best Awards** 2011 der WKO-Tirol (Mathias Trenkwalder und Dominik Ritter)
- 1. Platz beim Best Poster Award des 5. Forschungsforum d. Österr. FH'S (Gregor Fili, MSc. und Gregor Höfer, MSc.)