ULTRAFILTRATION MEMBRANES BASED ON PES-PEG BLOCKCOPOLYMERS

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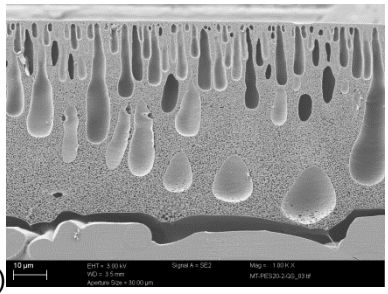
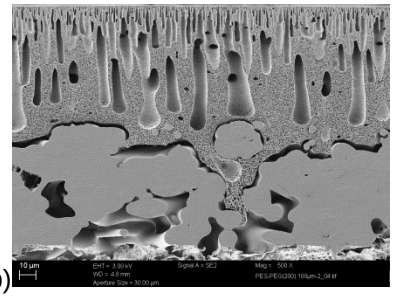
Although subject to research for decades, fouling is still one of the major limiting factors in membrane applications. Numerous methods have been suggested to overcome this shortcoming, like crossflow filtration, backflushing, air sparging, all of them in combination with chemical cleaning. However many of these techniques imply off-production cycles, resulting in lower yield, shorter lifetime of membranes and therefore higher costs.

Another approach to reduce fouling involves the modification of membranes with charged and / or hydrophilic polymers. These are either added to the casting solution or subsequently grafted onto the membrane surface. However, both methods have their specific drawbacks. Adding hydrophilic polymers to the dope solution leads to a significant loss during membrane preparation step (coagulation). On the other hand graft modification involves most often several steps and bears the risk of damaging (degrading) the membrane material resulting in loss of mechanical stability.

In this work we report on UF membranes prepared from poly(ether sulfone)-poly(ethylene glycol) block copolymers with poly(ethylene glycols) of molecular weights varying from 200 g/mol to 4000 g/mol but constant molar fraction of 5 mol%. Furthermore, block copolymers with increasing content of PEG-200 up to 20 mol% were prepared. This approach has the advantage over surface modification that the degree of functionalization can be easily controlled by the monomer composition. UF-membranes from block copolymers were prepared by conventional NIPS process using NMP as solvent and water as non-solvent. The effect co-monomer type (molecular weight of PEG) and co-monomer concentration on the morphology of the resulting membranes (Figure 1) as well as their filtration properties including protein fouling will be discussed in detail.

Figure 1 – cross section from a) PES; b)PES-PEG(200) and c) PES-PEG(2000) membranes

a)  b)  c)