Sustainable membrane fabrication through polyelectrolyte complexation: a green chemistry approach

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Green chemistry methods have become increasingly popular in recent decades. Polymer membrane fabrication methods are often require the use of organic solvents (DMF, THF, and DMA, NMP). The toxicity of NMP can adversely affect human health and also imposes massive recycling costs to satisfy the stringent environmental regulations. A potential solution to the problem of using organic solvents is membranes based on polyelectrolyte complexes [1]. These materials are composed of oppositely charged polyelectrolytes that can offer high water fluxes because of their charged chemistry and are processed from simple queous solutions that are environmentally benign. [2].

In these study polyelectrolyte membranes membranes based on poly(sodium 4-styrenesulfonate) (PSS) and poly(diallyldimethylammonium chloride) (PDADMAC) were prepared from water solution. The membranes were formed on the support with 200 μm (02p) and 400 μm (04p) thickness of active layer. The morgology of PEC and membranes surface properties were studied by SEM, AFM and electrocineyic analysis. The 02p membrane shows higher roughness (Fig. 1 a-d) and better volume flow (Fig. 1 e). The values of the flux shows that obtained membranes could be classified as nanofiltration membranes. IEP at 9.98 allows to assume excess of amino groups of PDADMAC on the surface and potential application of the membranes for anions retention (Fig. 1 f).

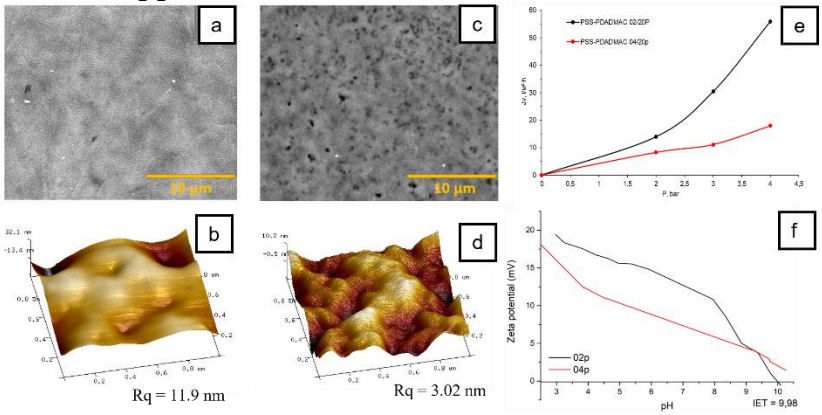

Fig. 1. SEM and AFM images of 02p membrane (a, b), 04p membrane (c, d), their zeta potential curves (f) and dependence of pure water volume flow on pressure (e)

1. J. Kamp *et al*. J. Membr. Sci. **618** (2021) 118632.
2. K. Sadman *et al*. ACS Applied Materials and Interfaces. **11** (2019) 16018.