

P9. EFFECT OF RADIATION GRAFTING PARAMETERS IN THE MORPHOLOGY AND MECHANICAL PROPERTIES OF FEP-BASED FILMS FOR ALKALINE ANION-EXCHANGE MEMBRANE FOR FUEL CELL APPLICATIONS

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To understand the influence of radiation grafting parameters (gamma radiation dose, time of grafting, monomer concentration and solvent type) on the morphology and mechanical properties of poly (hexafluoropropylene-co-tetrafluoroethylene) (FEP) film, for alkaline anion-exchange membrane for fuel cell application. FEP grafted films were evaluated by PeakForce QNM (Quantitative Mechanical Properties Mapping). The radiation grafting of styrene onto 125 μm thickness poly (hexafluoropropylene-co-tetrafluoroethylene) (FEP) films was carried out by a simultaneous method using a Cobalt-60 gamma source, at doses of 40 and 60 kGy [1]. The QNM images indicated that the average roughness of grafted films was affected by the grafting conditions: lower doses and higher grafting time increased the average roughness [2]. The solvent solubility changed the roughness at low doses, while the monomer concentration did not influence the roughness. Adhesion and elastic modulus were affected by the solvent concentration and grafting time. Further tests in the alkaline anion-exchange membrane, for fuel cell applications, should be carried out for more consistent and reliable results.

References

- [1] Slade C. T. R., Varcoe R. J. Investigation of conductivity in FEP-based radiation-grafted alkaline anion-exchange membranes, *Solid State Ionics*, 176 (2005), 585 – 597.
- [2] Deng H., Xu Y., Chen Q, Wei X., Zhu B. High flux positively charged nanofiltration membranes prepared by UV-initiated graft polymerization of methacrylateoethyl trimethyl ammonium chloride (DMC) onto polysulfone membranes. *Journal of Membrane Science*, 366 (2011), 363 – 372.