Supplemental Information

Synthesis of Polyethylene-based Proton Exchange Membranes Containing PE Backbone and Sulfonated Poly(arylene ethersulfone) Side Chains for Fuel Cell Applications

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Determination of PAES Molecular Weight by End Group Analysis

Molecular weight of PAES was determined by ¹H NMR spectrum, comparing the peak intensity of aromatic groups at the end group (7.7 ppm) and the peak intensity of aromatic groups in the repeating units (6.8 ppm). For example, a PAES polymer shows that the peak intensity at 7.7 ppm is 45 times of the peak intensity at 6.8 ppm. This PAES polymer contains 45 repeating units with a molecular weight of 20,000 g/mol. By this procedure, the molecular weight of all PAES polymers was determined.

TGA Thermograms

Figure S1. TGA thermograms of several PE random and graft copolymers

FTIR Spectra

Figure S2. FT-IR spectra of a) PAES, b) PE-g-PAES c) PE-g-s-PAES

Figure S3. DSC curves of PE-g-PAES graft copolymer and PAES homopolymer.

Table S1. Summary of contact angle measurement of PE polymers and Nafion117

	PE-co-p-MS	Br-PE-co-p-MS	PE-g-PAES(B-4)	PE-g-s-PAES(s-B-4)	Nafion117
Contact Angle (°) 0 min	103.95	100.89	100.34	98.41	80.27
Contact Angle (°) 3mins	--	--	99.97	86.61	38.03