Electronic Supplementary Material (ESI) for RSC Advances.

The synthesis of **poly(phenylene sulfide sulfone) in ionic liquids at atmospheric pressure**

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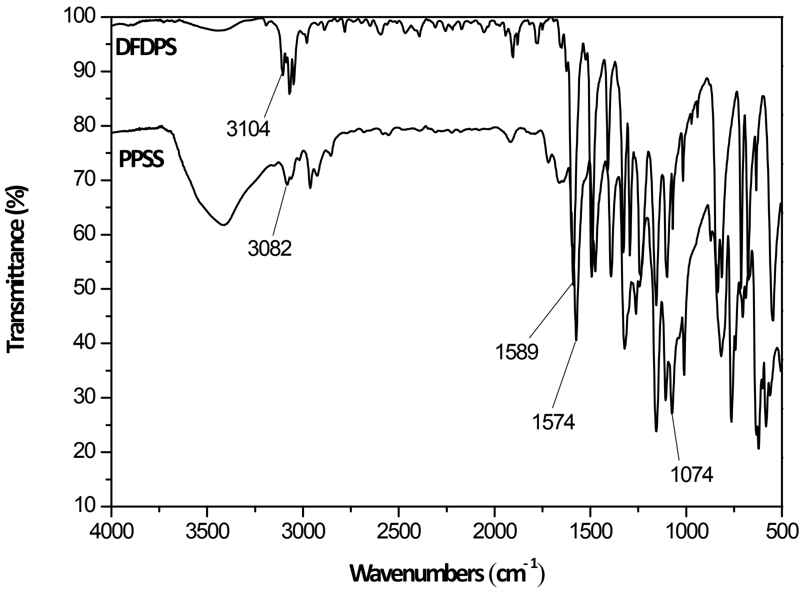

Figure S1. FT-IR spectra of DFDPS and PPSS

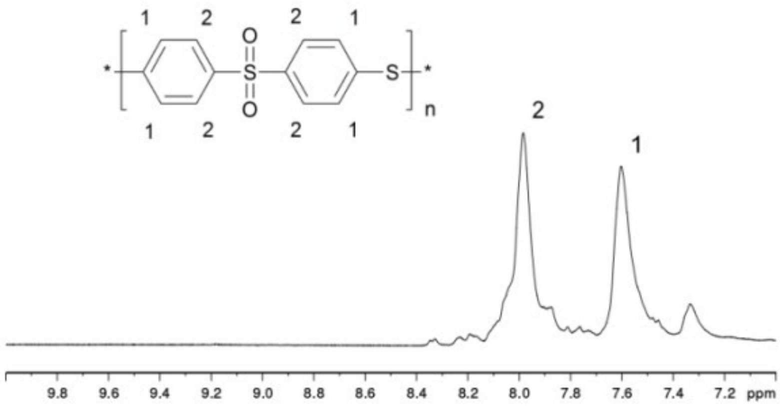

Figure S2. ^{1}H NMR spectrum of PPSS

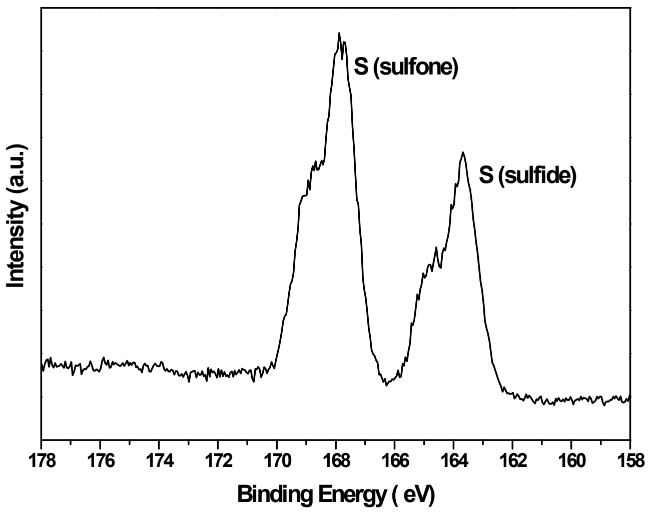

Figure S3. XPS profile of PPSS

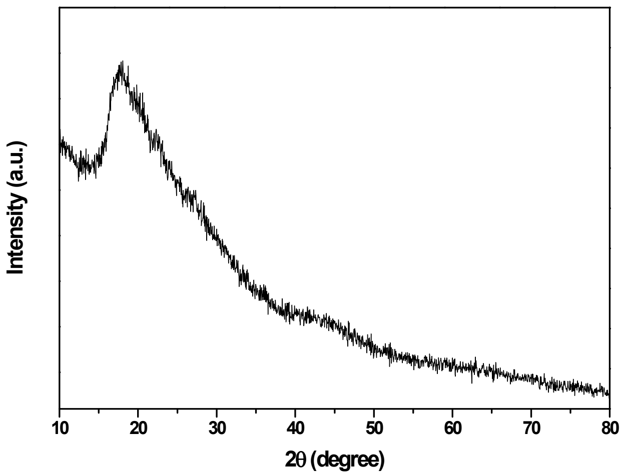

Figure S4. XRD pattern of PPSS

Table S1. The synthesis of PPSS in NMP

Entry[a]	time (h)	M_n[b] (10^4)	M_w[b] (10^4)	PDI[b]	Yield (%)
1	4	1.5	2.6	1.55	85.4

[a] General polymerisation conditions: equimolar of $Na_2S·9H_2O$ and DFDPS, slightly excess of catalyst, 0.1 mole NaOH, 25.9 wt% monomer concentration, dehydrate at 145-155 °C for 0.5 h, and then polymerized at 180 °C for another 4 h. Polymers were washed by propanone–water mixture (1:1 w/w) and water, and then collected by simple filtration. [b] Number-average molecular weight (M_n), weight-average molecular weight (M_w) and polydispersity index (PDI) were measured by GPC calibrated with polystyrene standards.

(a) (b)

Figure S5. Photographs of Dean–Stark trap after removing toluene by purging nitrogen in preparation process of PPSS (a) NMP used solvent, (b) in IL/ZI used solvent

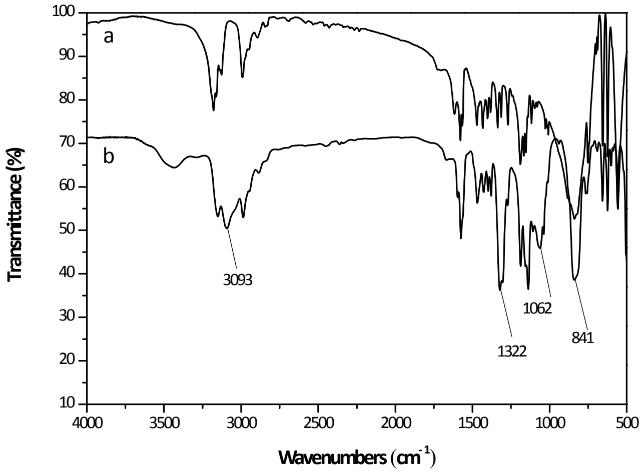

Figure S6. FT-IR spectra of IL *i*-pmim PF_6 before (a) and after use in polymerization (b)

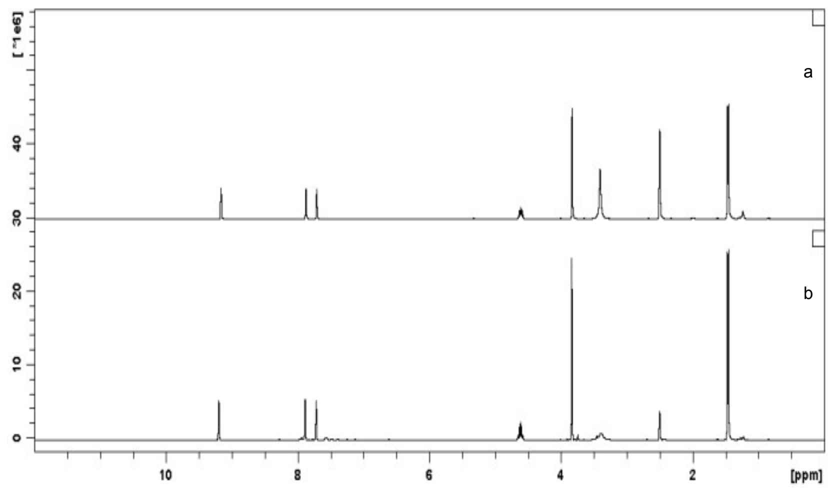

Figure S7. ^{1}H NMR spectra of *i*-pmim PF_6 before (a) and after use in polymerization (b)