Supporting Information for

Alkyl bisimidazolium-mediated crosslinked comb-shaped polymers as highly conductive and stable anion exchange membranes

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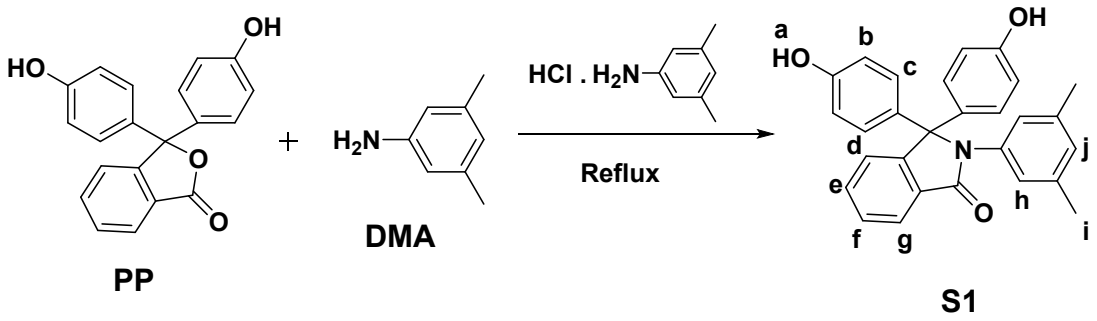


Scheme S1. Synthetic route to the cardo monomer **S1**

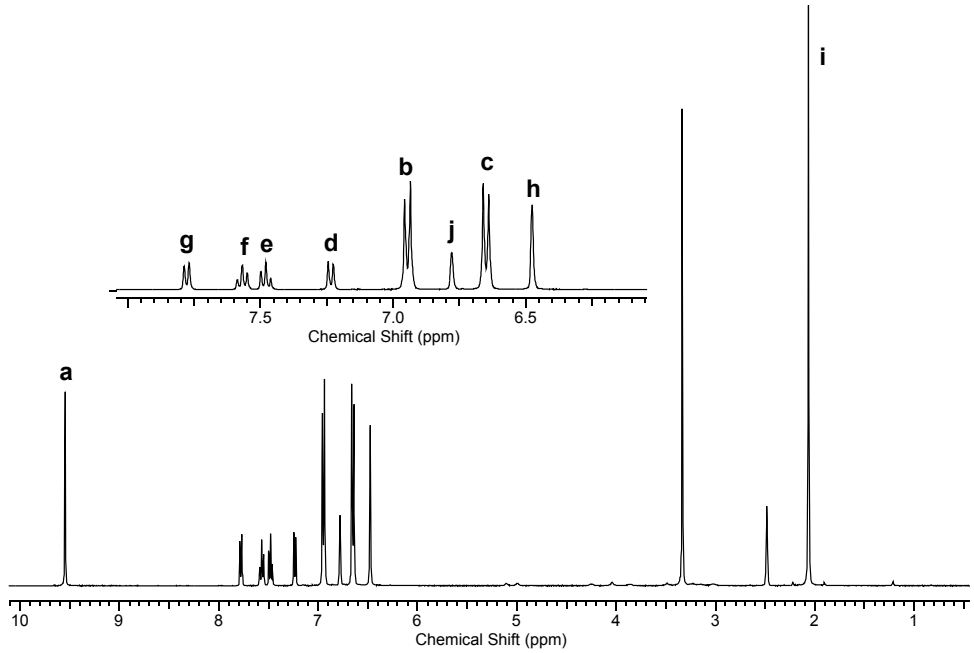
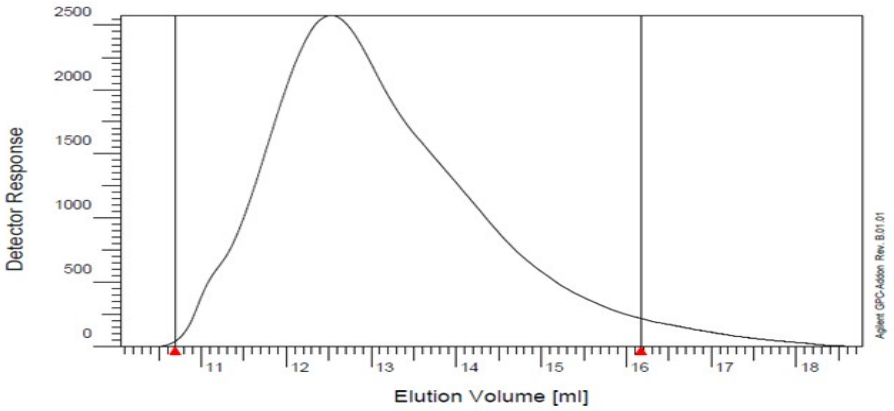


Figure S1. ^{1}H NMR spectrum of the cardo monomer **S1** in d_6-DMSO



Sample :	AHN-2-Block		
Injection Date :			
Calibration File :	130109-Cal-DMF-linear.CAL		
Calibration Date :			
Baseline from :	10.054 min	**Baseline to :**	18.774 min
Integration from:	10.691 min	**Integration to :**	16.173 min
MHK - A (Cal.):	0.000000E+0	**MHK - K (Cal.):**	1.000000E+0 ml/g
Eluent :	....?	**Flowrate :**	1.000 ml/min
Concentration :	1.000 g/l	**Inject volume :**	20.000 ul
Column 1 :	....?	**Temperature :**	23.000 C
Detector 1 :	RID A, Refractive Index Signal	**Delay volume :**	0.000 ml
Operator :	JM	**Acquisition interval :**	0.430 sec

rid1A

Mn :	1.3844e5	g/mol
Mw :	2.4029e5	g/mol
Mz :	3.4434e5	g/mol
Mv :	0.000000	g/mol
D :	1.7357e0	
[n]:	0.000000	ml/g
Vp :	1.2528e1	ml
Mp :	2.6707e5	g/mol
A :	6.5869e3	ml*V
10%	6.4321e4	g/mol
30%	1.3450e5	g/mol
60%	2.5179e5	g/mol
85%	4.0079e5	g/mol
90%	4.5776e5	g/mol

Figure S2. GPC trace of the multiblock copolymer **5**

(a) (b)

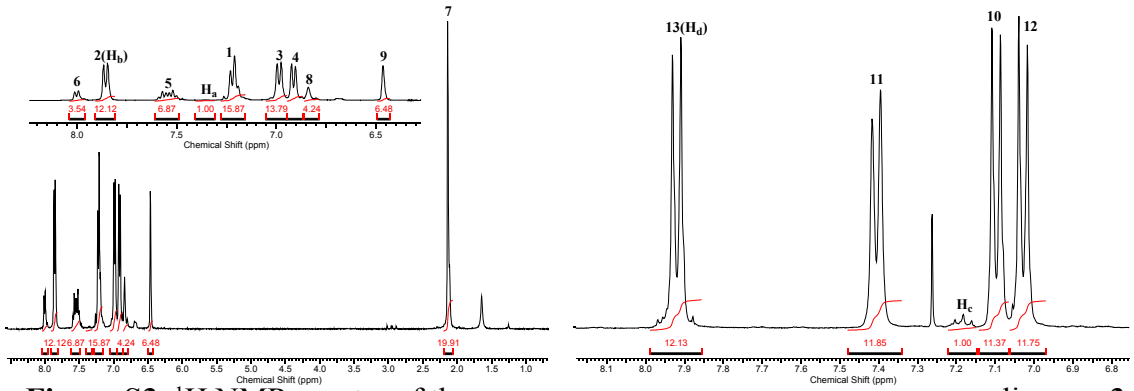


Figure S3. ^{1}H NMR spectra of the oligomer **3** (a) and **4** (b) in $CDCl_3$

Table S1. Solubility and gel fraction data for the Br-PES (**2**) and crosslinked BI-cPES (**1**) membranes

Membrane	Gel fraction (%)	Solubility			
		DMF	DMSO	DMAc	NMP
Br-PES	NA[b]	+	+	+	+
BI-cPES-4	92.2	−	−	−	−
BI-cPES-6	92.4	−	−	−	−
BI-cPES-10	92.1	−	−	−	−

[a] +: soluble and −: insoluble [b]: Not applicable

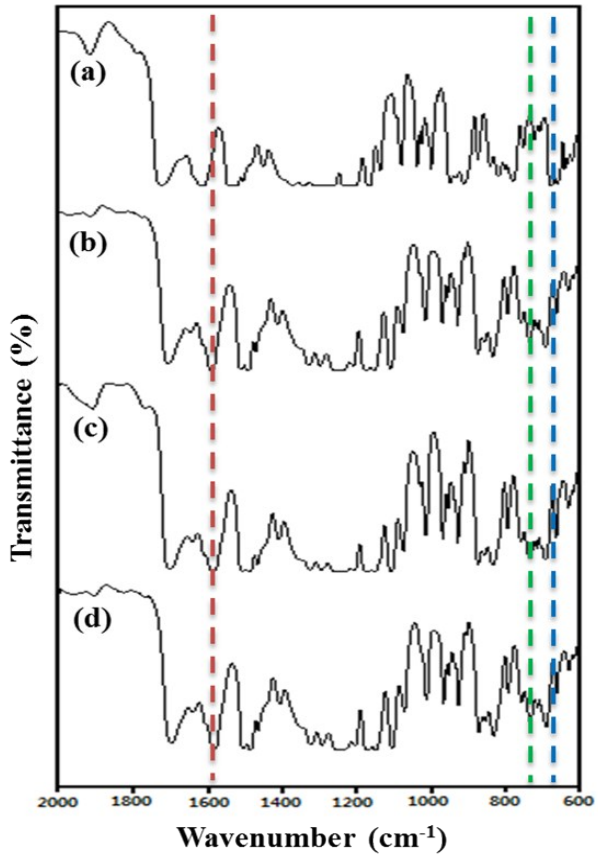


Figure S4. FT-IR spectra of the Br-PES **2** (a) and crosslinked BI-cPES membranes (BI-cPES-4 (b), BI-cPES-6 (c), and BI-cPES-10 (d)).

Table S2. UTM data for the crosslinked BI-cPES membranes and their precursor (Br-PES)

Membrane	Stress (MPa)	Strain (%)	Young's modulus (GPa)
Br-PES	44.53	8.50	1.1
BI-cPES-4	56.49	4.44	2.1
BI-cPES-6	69.96	4.34	2.4
BI-cPES-10	72.18	2.40	3.9

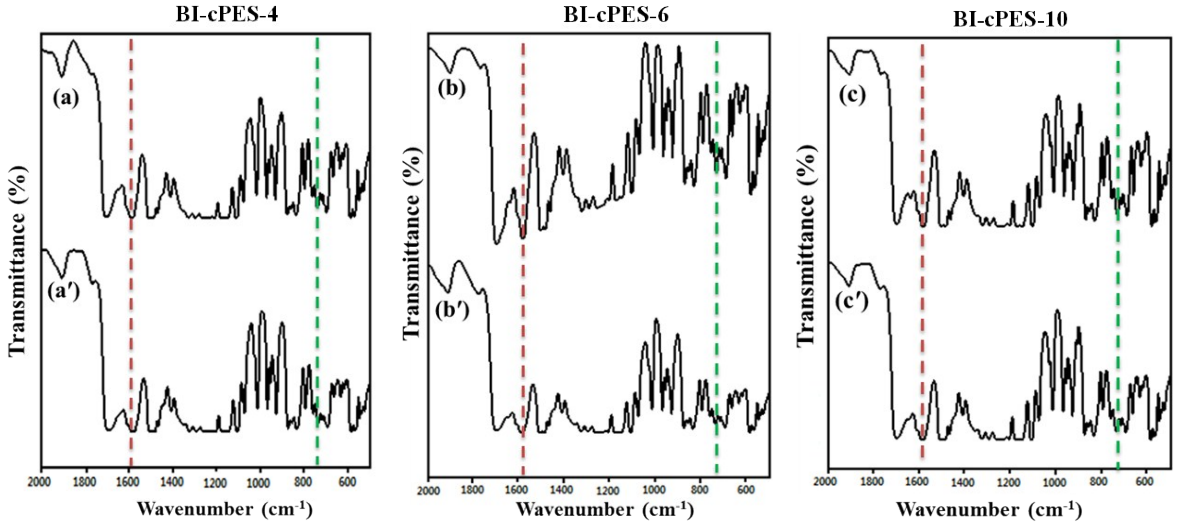


Figure S5. FT-IR spectra of the crosslinked BI-cPES membranes before (BI-cPES-4 (a); BI-cPES-6 (b); BI-cPES-10 (c)) and after (BI-cPES-4 (a'); BI-cPES-6 (b'); BI-cPES-10 (c')) alkaline stability

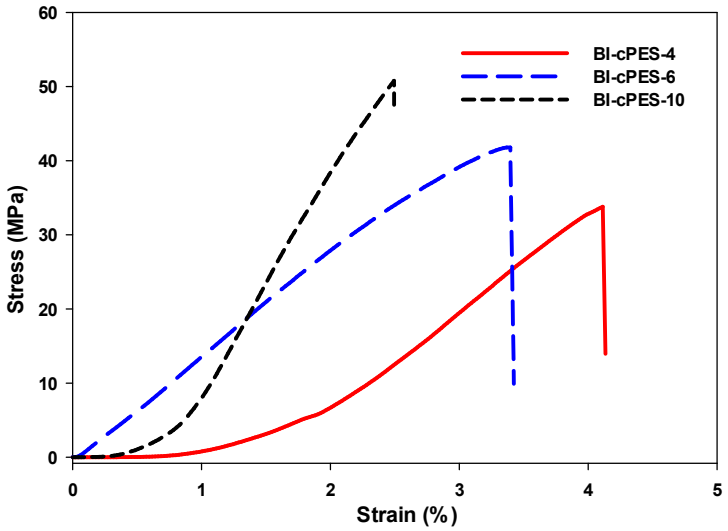


Figure S6. Stress–strain curves of the crosslinked BI-cPES membranes after the alkaline stability test in the dry state

Membrane	Stress (MPa)		Strain (%)		Young's modulus	
	Before	After	Before	After	Before	After
BI-cPES-4	56.1	33.8	4.4	4.1	2.1	1.3
BI-cPES-6	69.8	41.7	4.3	3.4	2.4	1.5
BI-cPES-10	72.5	50.7	2.4	2.3	3.9	3.1

Table S3. UTM data for the crosslinked BI-cPES membranes before and after soaking in 2 M NaOH at 60 ^{o}C for 350 h.

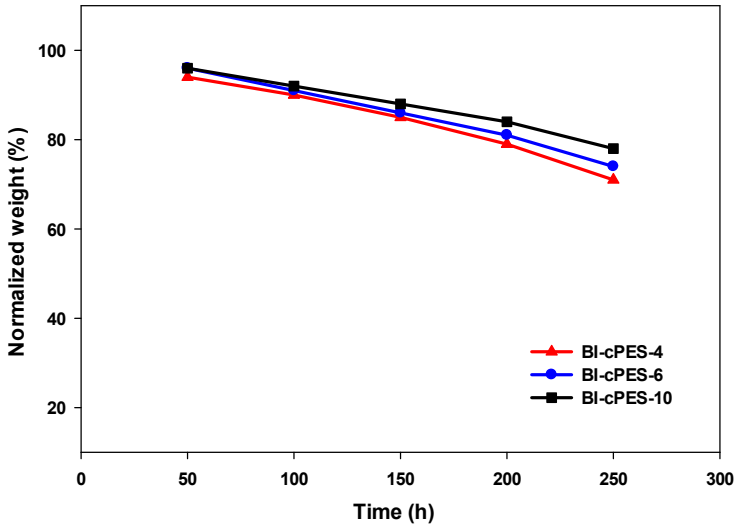


Figure S7. Weight loss of the crosslinked membranes in Fenton's reagent at 60 °C over 250 h