Supporting Information for

A New Class of PEO-mimetic Polypeptoids and their Application for Solid Polymer Electrolytes

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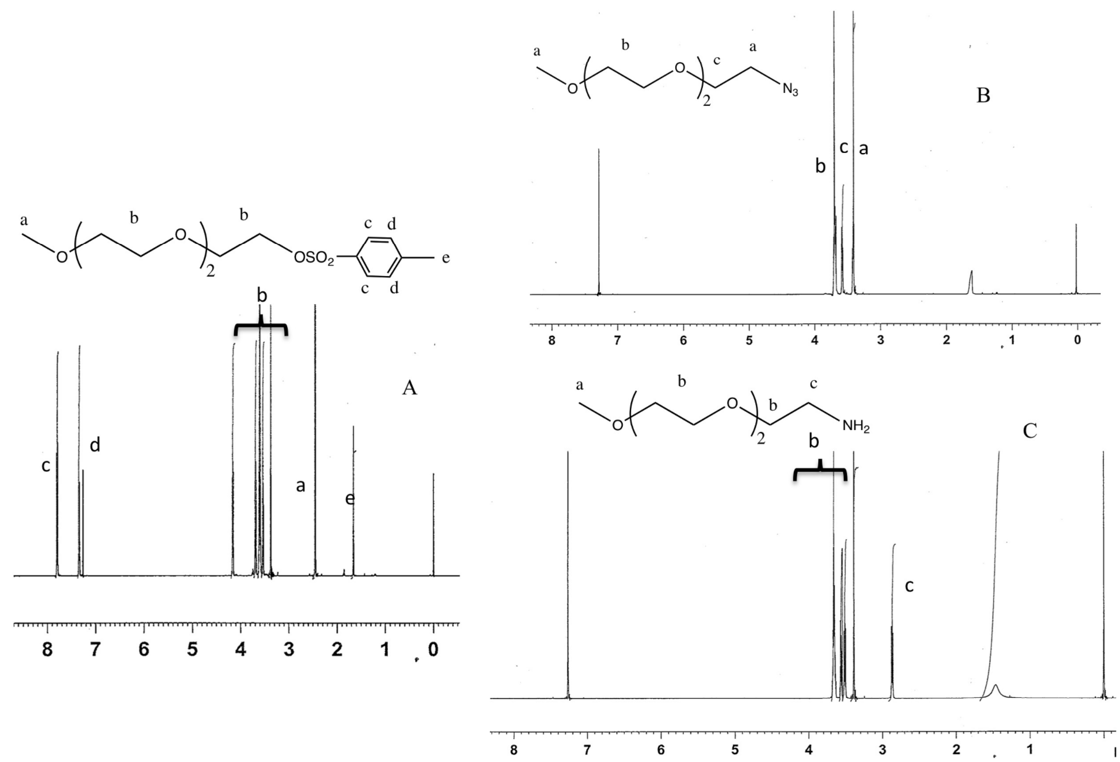

Figure S1. ^{1}H NMR spectrum (500 MHz, $CDCl_3$) of 2-(2-methoxyethoxy)ethyl tosylate (A), 2-(2-methoxyethoxy)ethyl azide (B), 2-(2-methoxyethoxy)ethyl amine (C).

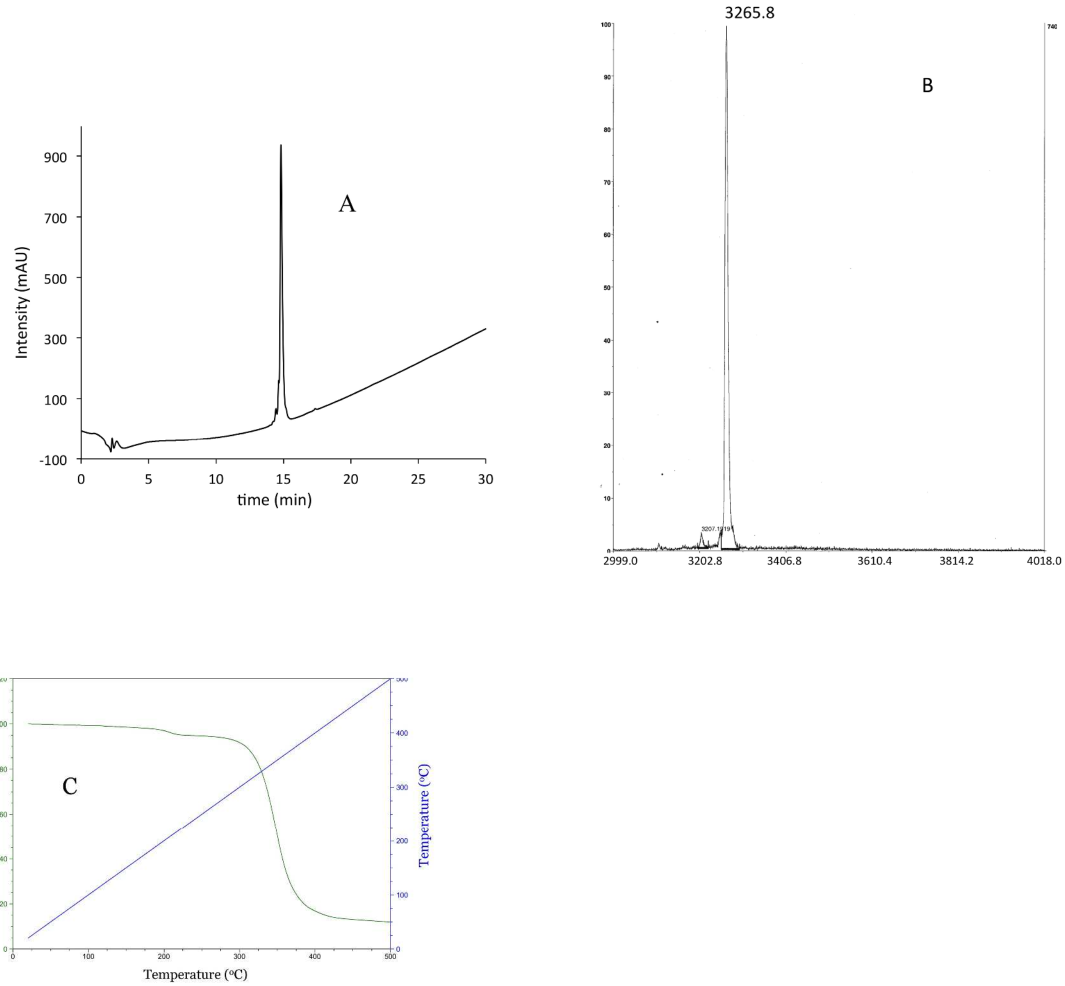

Figure S2. A typical analytical reverse-phase HPLC trace (A) of p(Nde)$_{20}$ showing the purity of the polymer after purification. A typical MALDI mass spectrum (B) demonstrating the exact molecular weight to be 3265.8. The observed molecular weight is increased by 23 due to sodium from the matrix used. (C) Thermogravimetric analysis of p(Nde)$_{20}$.

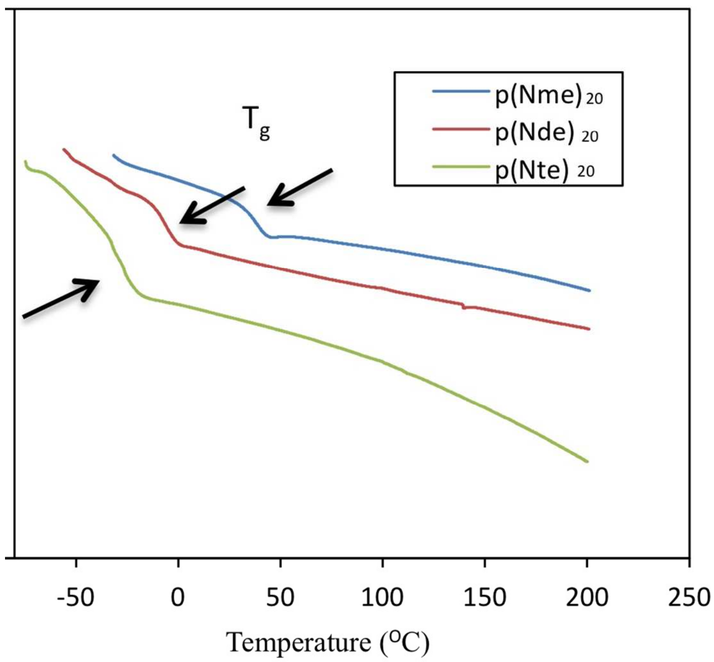

Figure S3. DSC endotherms for all polypeptoid 20mers. T_g value is identified by an arrow. Absence of a melting peak indicates an amorphous structure. p(Nme)$_{40}$ has a similar DSC endotherm, indicating that at even longer chain lengths this polymer is still amorphous (data not shown).

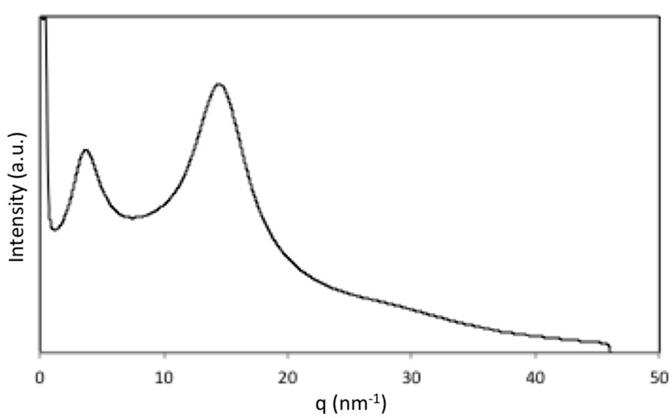

Figure S4. XRD spectra at room temperature obtained from p(Nte)$_{20}$. Broad peaks indicate a disordered structure.

Table S1. The fitting parameters of VTF equation in Figure 2.

Peptoids	A(S $K^{0.5}$/cm)	B(K)	T_0(K)	E_a(kJ/mol)
$(Nme)_{20}$	0.021	1024.54	242.75	8.5
$(Nde)_{20}$	0.21	1266.85	200.05	10.5
$(Nte)_{20}$	0.64	1448.15	187.8	12.0

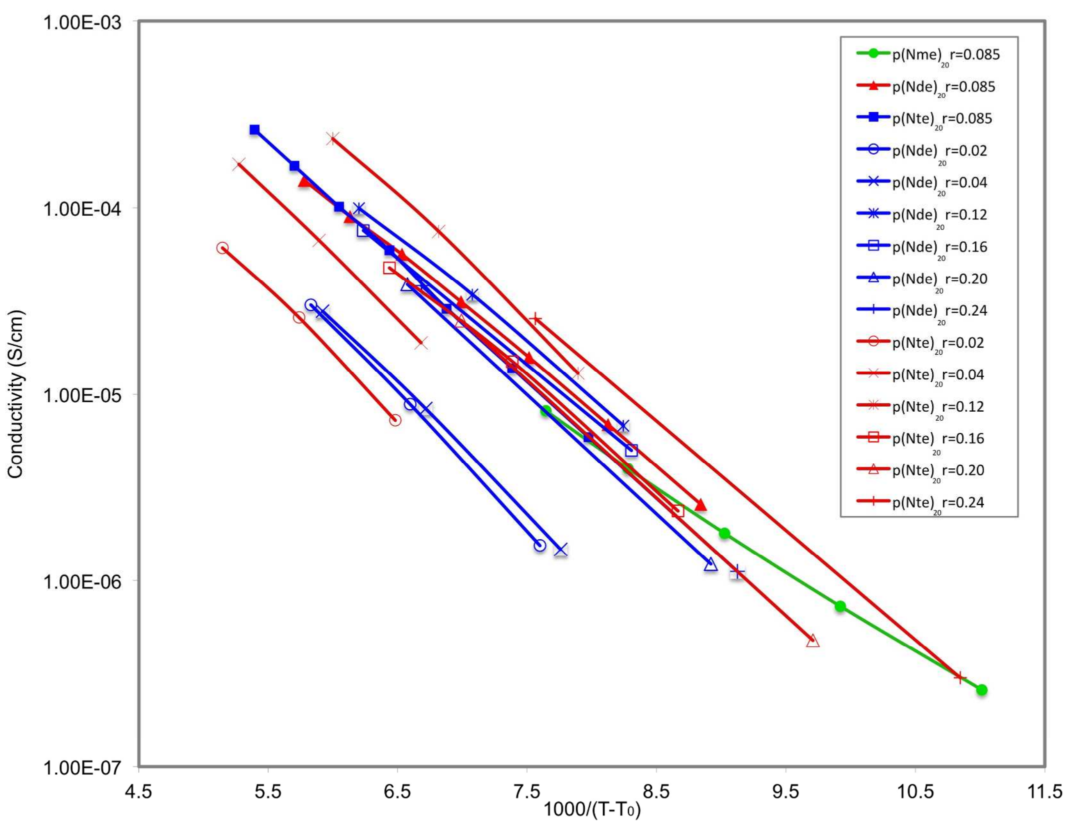

Figure S5. Full set of ionic conductivity plots as a function of 1000/(T-T_0).

Table S2. The fitting parameter $\triangle A$ as a function of r and n, when collapse all the other lines onto the r = 0.085 line. From this table, it can be seen clearly that $\triangle A$ is increasing with the increase of r and irrespective of n.

Peptoids	$p(Nde)_{20}$						$p(Nte)_{20}$					
r	0.02	0.04	0.12	0.16	0.2	0.24	0.02	0.04	0.12	0.16	0.2	0.24
$\triangle A(A_{n,r}/A_{0.085})$	0.17	0.18	1.25	0.93	0.74	0.86	0.16	0.54	2.14	0.80	0.91	2.09

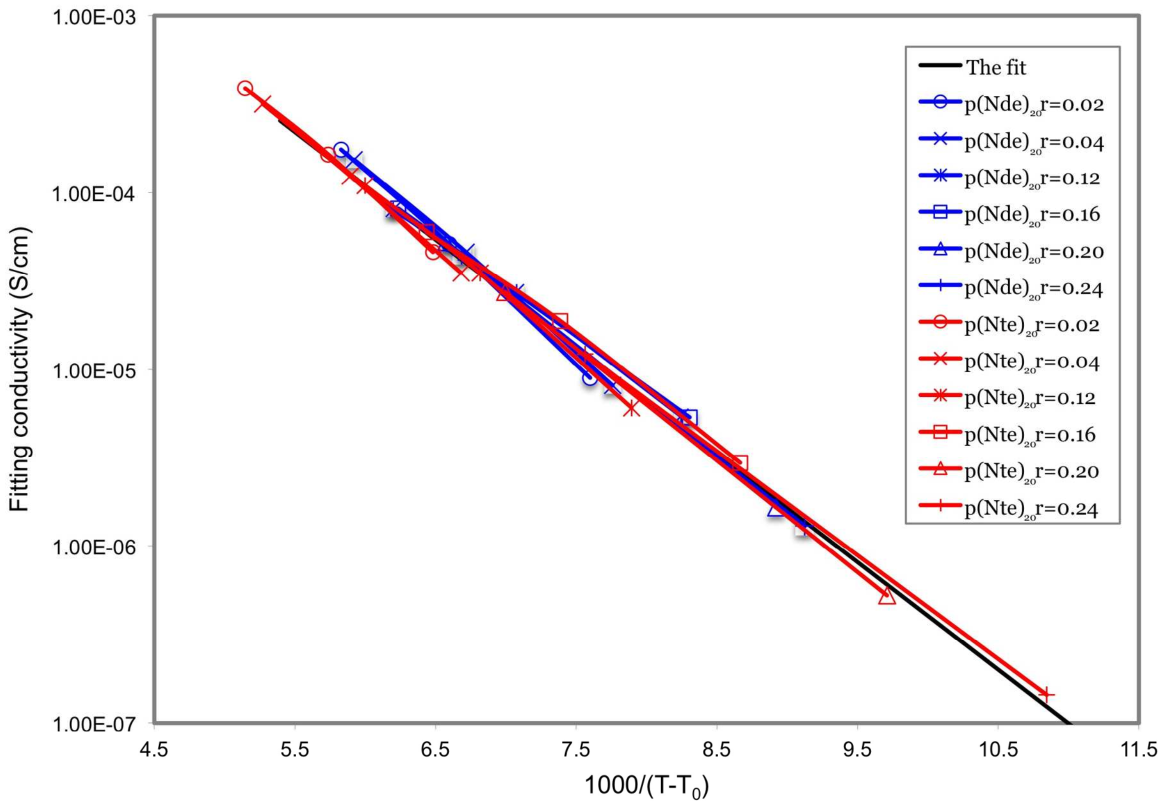

Figure S6. Full set of fitting ionic conductivity (considering $\triangle$A) plots as a function of $1000/(T\text{-}T_0)$.