Electronic Supplementary Material (ESI) for Polymer Chemistry.

Supporting Information to

"Impact of Molecular Weight on Electrochemical Properties of Poly(TEMPO methacrylate)."

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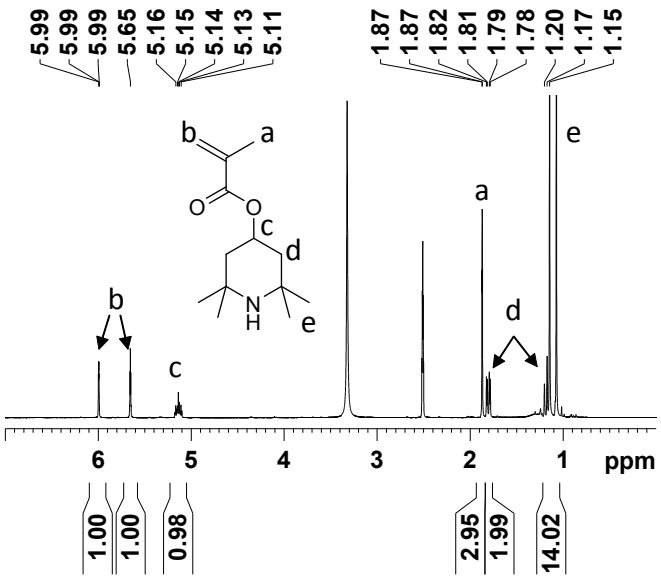

Figure S1. ^{1}H NMR spectrum (400MHz) of 2,2,6,6-tetramethylpiperidin-4-yl methacrylate (TMPM) in DMSO-d_6.

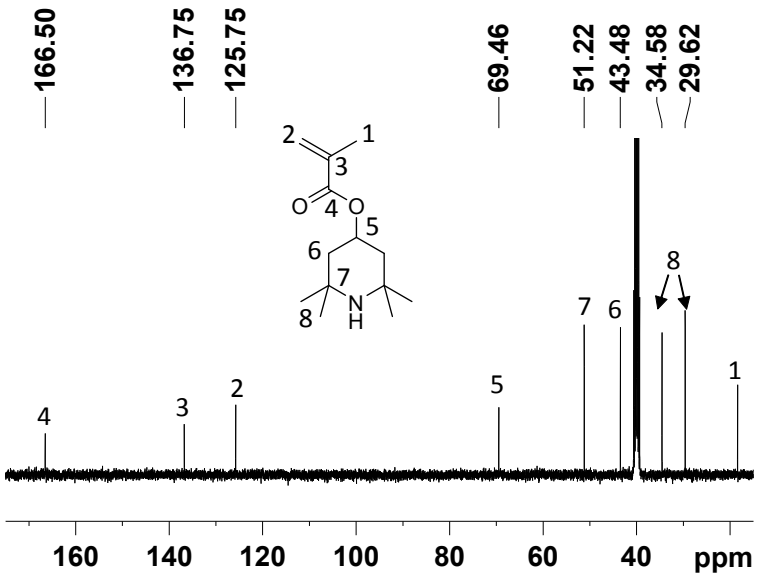

Figure S2. ^{13}C NMR spectrum (100MHz) of 2,2,6,6-tetramethylpiperidin-4-yl methacrylate (TMPM) in DMSO-d_6.

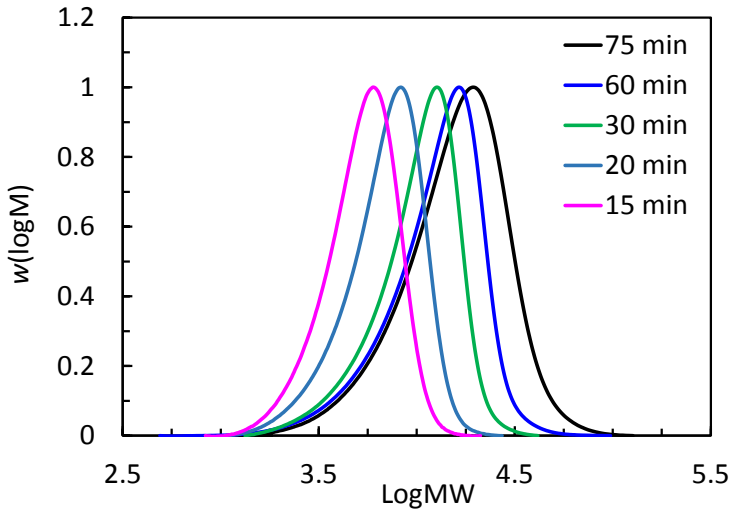

Figure S3. SEC traces of PTMA oxidised from PTMPM by H_2O_2 in methanol, the traces were recorded in THF SEC using polystyrene as standard.

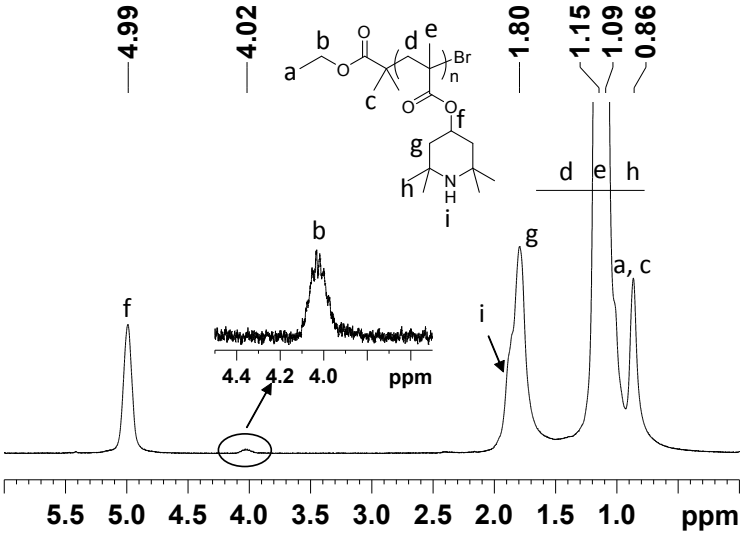

Figure S4. Typical ^{1}H NMR spectrum (400MHz) of $PTMPM_{66}$ in $CDCl_3$.

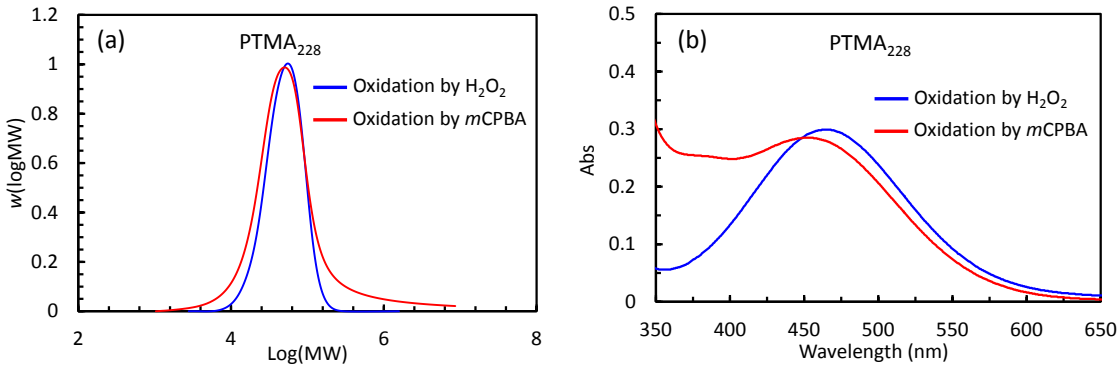

Figure S5. Comparison of two different oxidation methods to convert $PTMPM_{228}$ to $PTMA_{228}$, (a) SEC traces and (b) the UV-Vis spectra of $PTMA_{228}$ oxidised by H_2O_2 in methanol and *m*CPBA in dichloromethane.

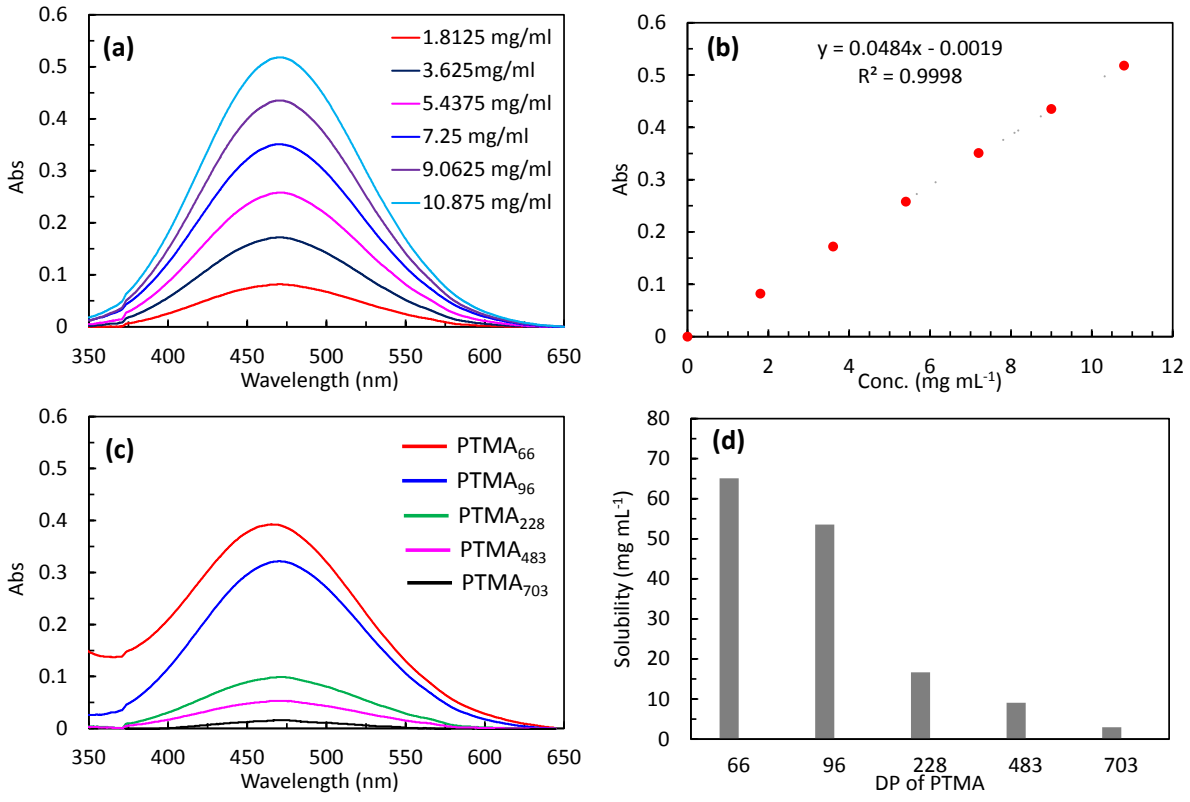

Figure S6. Solubility of PTMA in DMC with 1 M $LiPF_6$ determined by UV-Vis: (a) Absorption of 4-hydroxyl TEMPO with different concentration in THF, (b) Calibration curve (c) Absorption of PTMA in THF and (d) Solubility of PTMA with different DPs determined by UV-Vis.

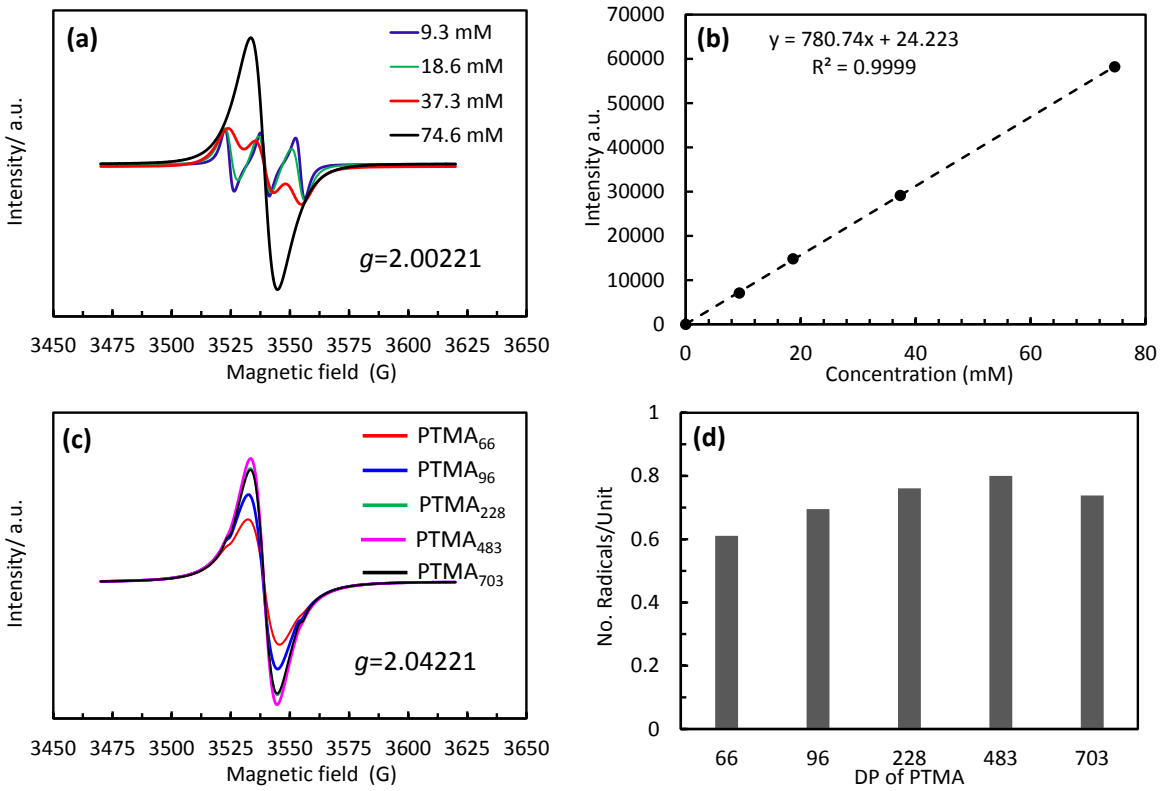

Figure S7. Oxidation efficiency determined by EPR: (a) EPR spectra of 4-hydroxyl TEMPO with different concentration in DCM, (b) Calibration curve based on integration of EPR spectra (c) EPR spectra of PTMA with different DPs oxidised from PTMPM by H_2O_2 and (d) Number of radicals per unit vs DP of PTMA determined by EPR.

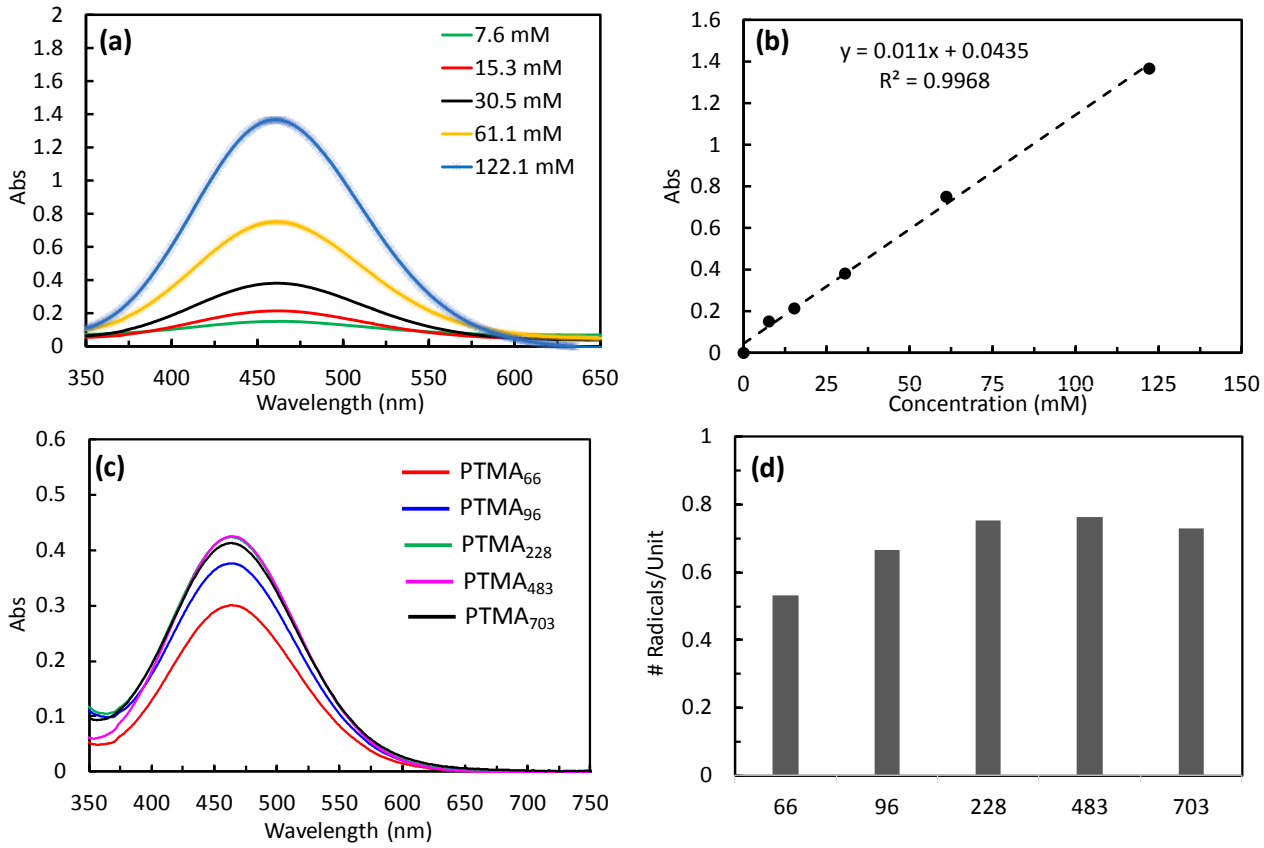

Figure S8. Oxidation efficiency determined by UV-Vis: (a) Absorption of 4-hydroxyl TEMPO with different concentration in DCM, (b) Calibration curve (c) Absorption of PTMA with different DPs oxidised from PTMPM by H_2O_2 and (d) Number of radicals per unit vs DP of PTMA determined by UV-Vis.

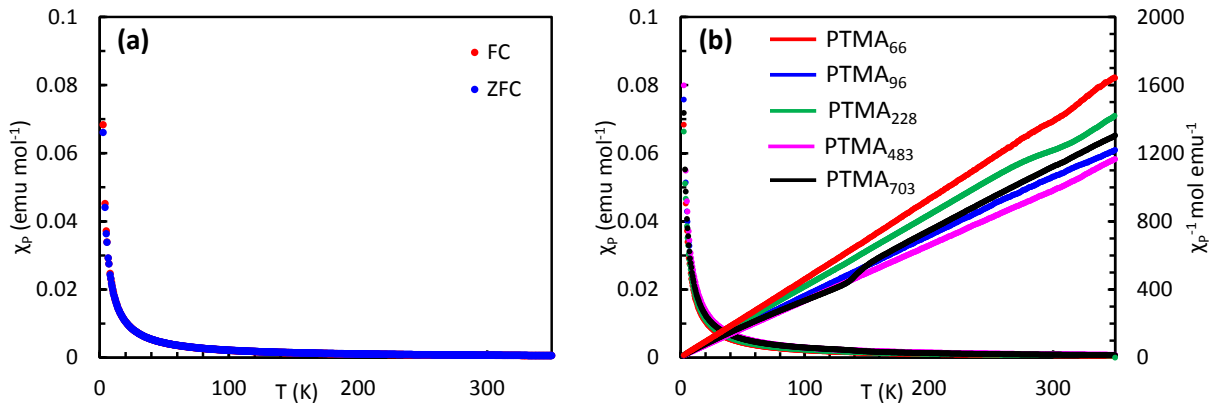

Figure S9. (a) Temperature dependence of the paramagnetic susceptibility χ_P of $PTMA_{66}$ with both field cooling (FC) and zero-field cooling (ZFC) modes. (b) Temperature dependence of the paramagnetic susceptibility χ_P and its inverse χ_P^{-1} of all PTMA polymers with FC mode. All the measurements carried out at an applied magnetic field strength of 10 KOe.

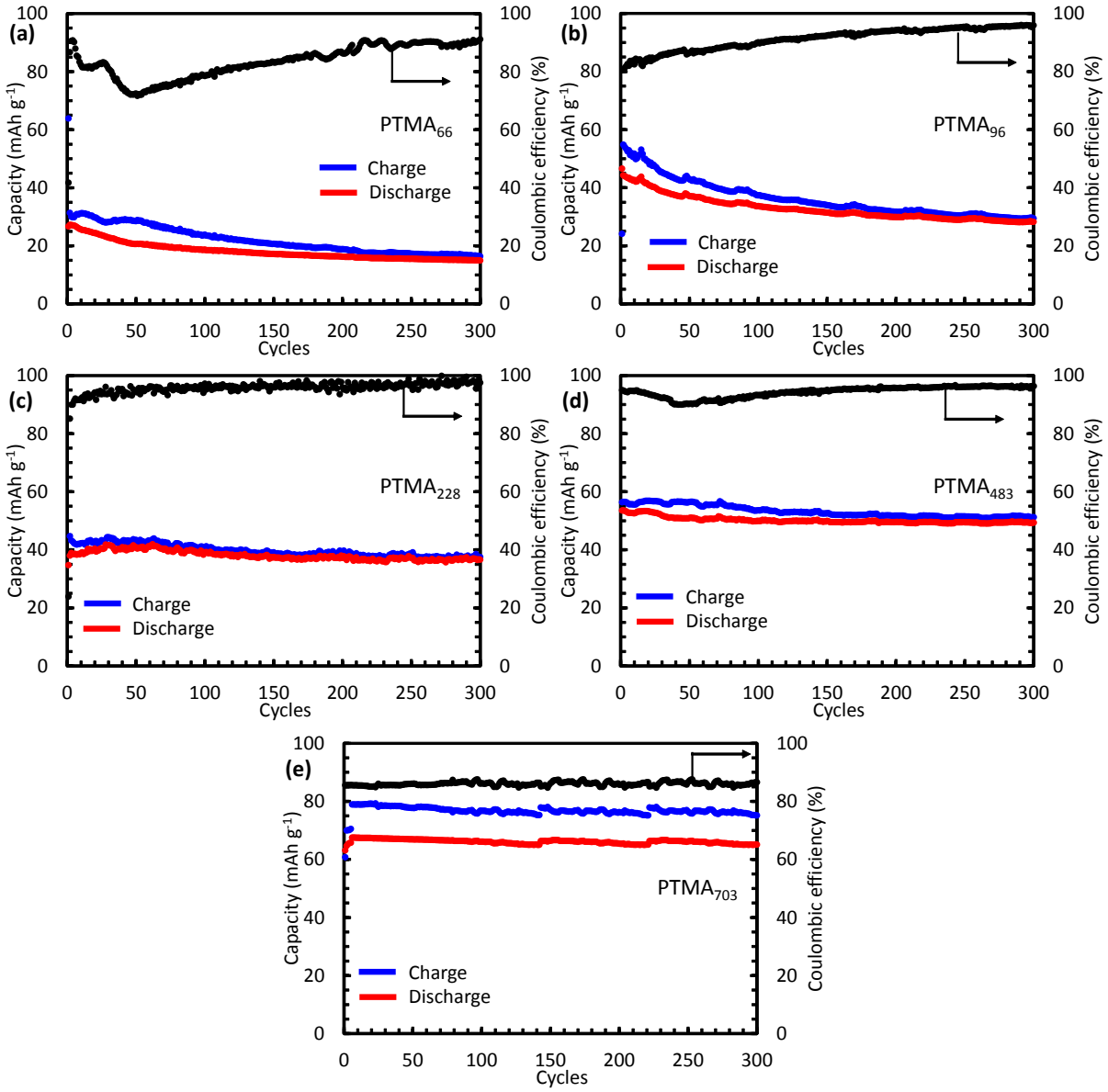

Figure S10. Cycling property and coulombic efficiency of (a) $PTMA_{66}$, (b) $PTMA_{96}$, (c) $PTMA_{228}$, (d) $PTMA_{483}$, and (e) $PTMA_{703}$ as cathode with mass ratio of PTMA/SP carbon/PVdF=0.25/0.65/0.1, charging/discharging at 1C over 300 cycles.

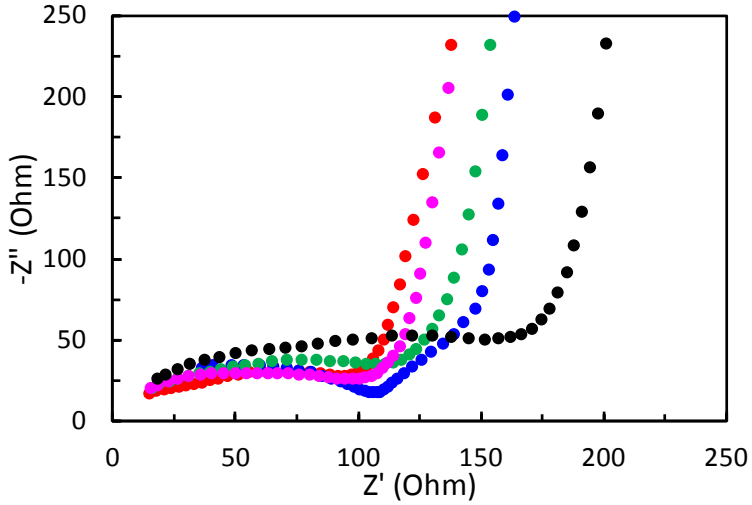

Figure S11. Nyquist plot of PTMA with different DPs as cathode at mass ratio of PTMA/SP carbon/PVdF=0.25/0.65/0.1, and 0.1 M $LiPF_6$ in DMC as electrolyte.