Electronic Supplementary Material (ESI) for RSC Advances.

Initiating a high temperature zinc ion battery through a triazolium-based ionic liquid

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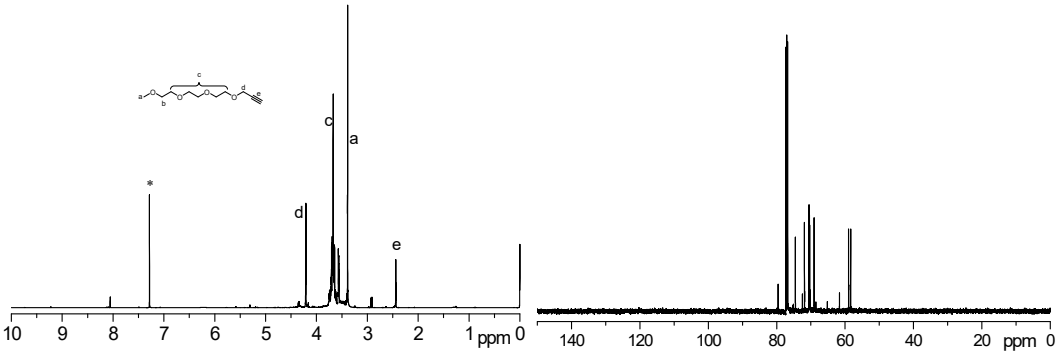

Fig. S1 ^{1}H NMR and ^{13}C NMR spectra of compound **1** ($CDCl_3$)

NMR data for compound **1.** ^{1}H NMR (500 MHz, $CDCl_3$): δ 4.21 (2H, -CH_2C≡CH), 3.75-3.59 (10H, -CH_2O-), 3.56 (2H, -CH_2OCH$_3$), 3.39 (3H, -OCH_3), 2.44 (1H, -C≡C*H*). ^{13}C NMR (125 MHz, $CDCl_3$) δ 79.60, 74.55, 72.50, 71.88, 70.56, 70.45, 70.36, 69.06, 61.62, 58.98, 58.37.

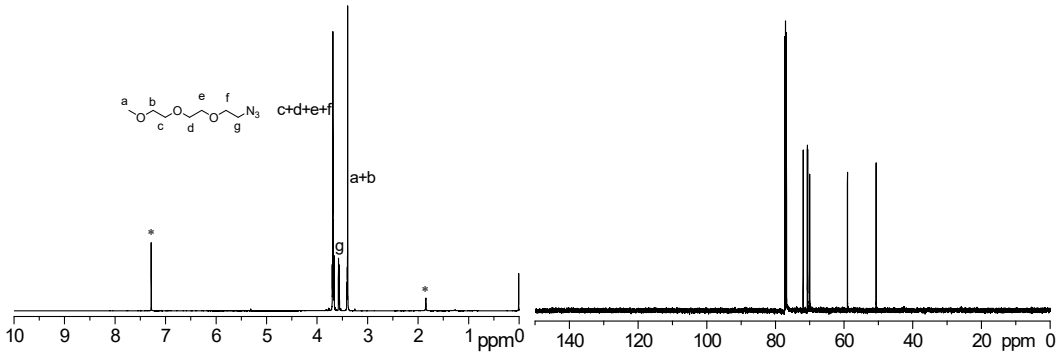

Fig. S2 ^{1}H NMR and ^{13}C NMR spectra of compound **2** ($CDCl_3$)

NMR data for compound **2.** ^{1}H NMR (500 MHz, $CDCl_3$): δ 3.69 (10H, -CH_2O-), 3.57 (2H, -CH_2N$_3$), 3.39 (3H, -CH_2OCH_3). ^{13}C NMR (125 MHz, $CDCl_3$) δ 71.93, 70.70, 70.66, 70.60, 70.02, 59.02, 50.68.

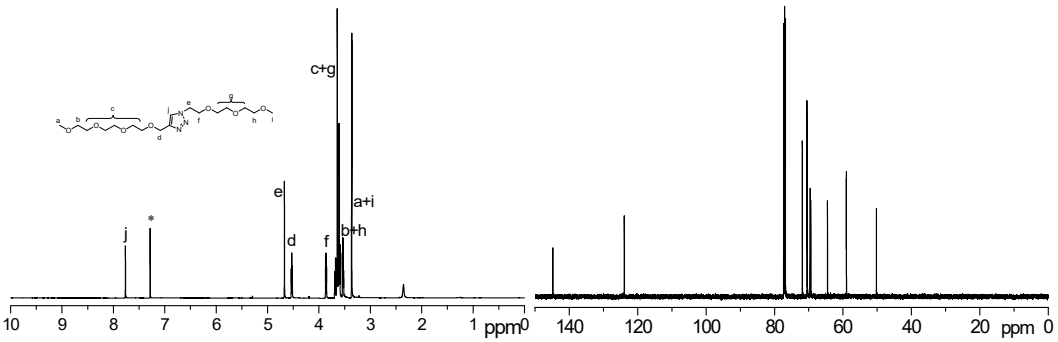

Fig. S3 ^{1}H NMR and ^{13}C NMR spectra of compound **3** ($CDCl_3$)

NMR data for compound **3.** ^{1}H NMR (500 MHz, $CDCl_3$): δ 7.77 (1H, triazole-*H*), 4.67 (2H, -N=N-N-CH_2CH$_2$O-), 4.53 (2H, -N=N-CCH_2O-), 3.86 (2H, -N=N-NCH$_2$CH_2O-), 3.70-3.53 (20H, -CH_2O-), 3.36 (6H, -O-CH_3). ^{13}C NMR (125 MHz, $CDCl_3$) δ 144.81, 123.89, 71.87, 70.52, 70.44, 69.60, 69.42, 64.51, 58.98, 50.22.

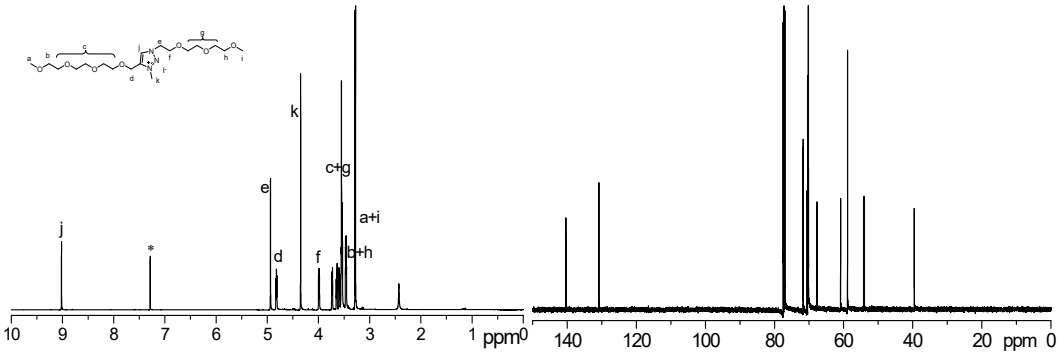

Fig. S4 ^{1}H NMR and ^{13}C NMR spectra of compound **4** ($CDCl_3$)

NMR data for compound **4.** ^{1}H NMR (500 MHz, $CDCl_3$): δ 9.02 (1H, triazole-*H*), 4.94 (2H, -N=N-N-CH_2CH$_2$O-), 4.81 (2H, -N=N-CCH_2O-), 4.35 (3H, triazole-CH_3), 3.98 (2H, -N=N-NCH$_2$CH_2O-), 3.73-3.46 (20H, -CH_2O-), 3.28 (6H, -O-CH_3). ^{13}C NMR (125 MHz, $CDCl_3$) δ 140.35, 130.84, 71.77, 71.73, 70.58, 70.38, 70.34, 70.27, 70.21, 70.16, 67.70, 60.89, 58.88, 54.12, 39.55.

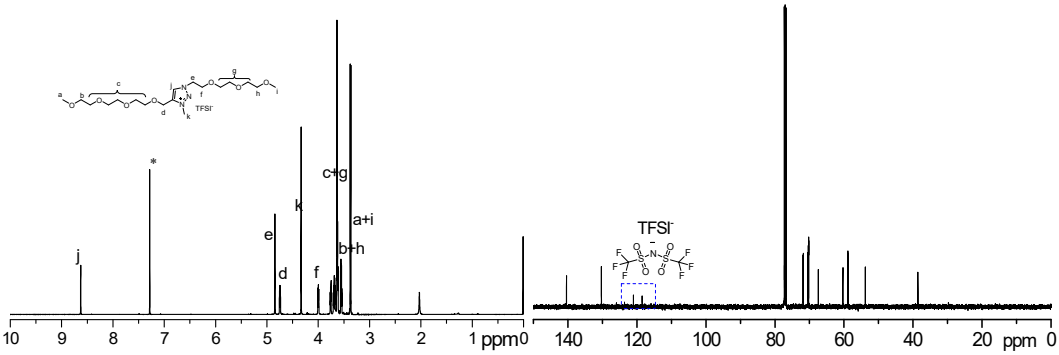

Fig. S5 ^{1}H NMR and ^{13}C NMR spectra of compound **T1** ($CDCl_3$)

NMR data for compound **T1.** ^{1}H NMR (500 MHz, $CDCl_3$): δ 8.63 (1H, triazole-*H*), 4.84 (2H, -N=N-N-CH_2CH$_2$O-), 4.75 (2H, -N=N-CCH_2O-), 4.33 (3H, triazole-CH_3), 4.00 (2H, -N=N-NCH$_2$CH_2O-), 3.75-3.55 (20H, -CH_2O-), 3.38 (6H, -O-CH_3). ^{13}C NMR (125 MHz, $CDCl_3$) δ 140.41, 130.29, 123.59, 121.03, 118.48, 115.92, 71.84, 71.77, 70.51, 70.45, 70.41, 70.36, 70.34, 70.23, 70.21, 67.45, 60.31, 58.87, 58.82, 53.83, 38.57.

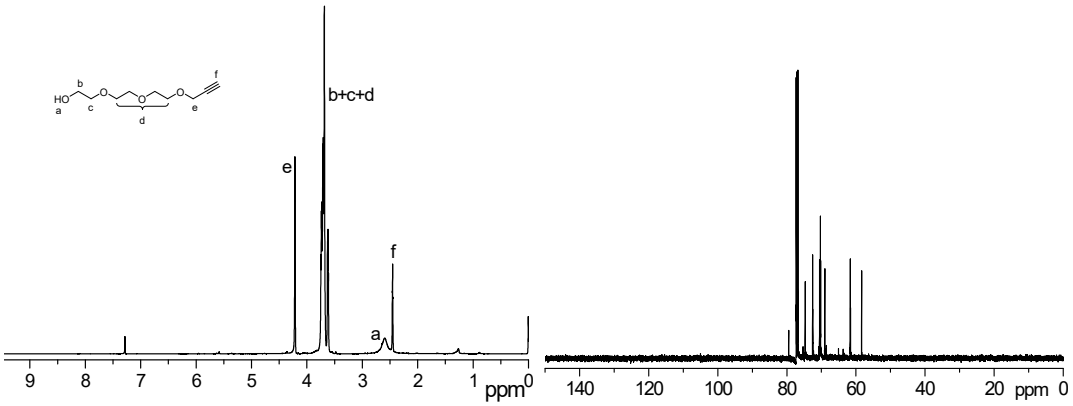

Fig. S6 ^{1}H NMR and ^{13}C NMR spectra of compound **5** ($CDCl_3$)

NMR data for compound **5.** ^{1}H NMR (500 MHz, $CDCl_3$): δ 4.21 (2H, -CH_2-CCH), 3.81-3.57 (12H, -O-CH_2-O-), 2.60 (1H, -O*H*), 2.46 (1H, -CC*H*). ^{13}C NMR (125 MHz, $CDCl_3$) δ 79.48, 74.70, 72.58, 72.53, 70.57, 70.29, 69.03, 61.65, 58.37.

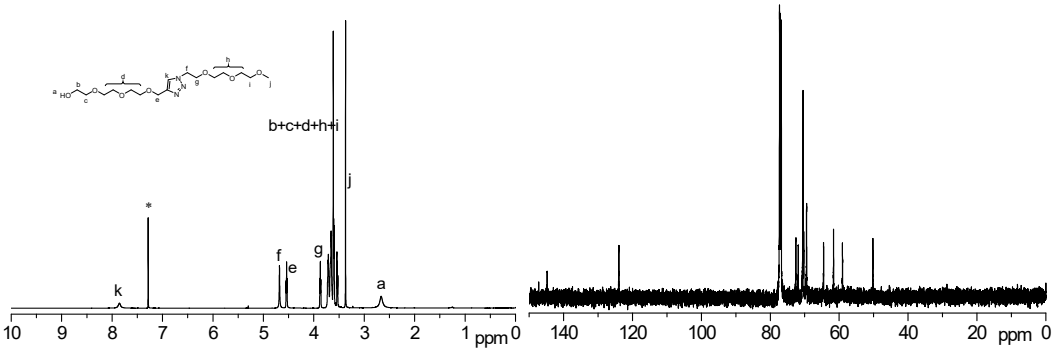

Fig. S7 ^{1}H NMR and ^{13}C NMR spectra of compound **6** ($CDCl_3$)

NMR data for compound **6.** ^{1}H NMR (500 MHz, $CDCl_3$): δ 7.85 (1H, triazole-*H*), 4.68 (2H, -N=N-N-CH_2CH$_2$O-), 4.54 (2H, -N=N-CCH_2O-), 3.87 (2H, -N=N-NCH$_2$CH_2O-), 3.71-3.54 (20H, -CH_2O-), 3.37 (3H, -OCH_3), 2.66 (-O*H*). ^{13}C NMR (125 MHz, $CDCl_3$) δ 144.67, 123.95, 72.57, 71.87, 70.50, 70.28, 69.45, 64.52, 61.64, 59.04, 50.21.

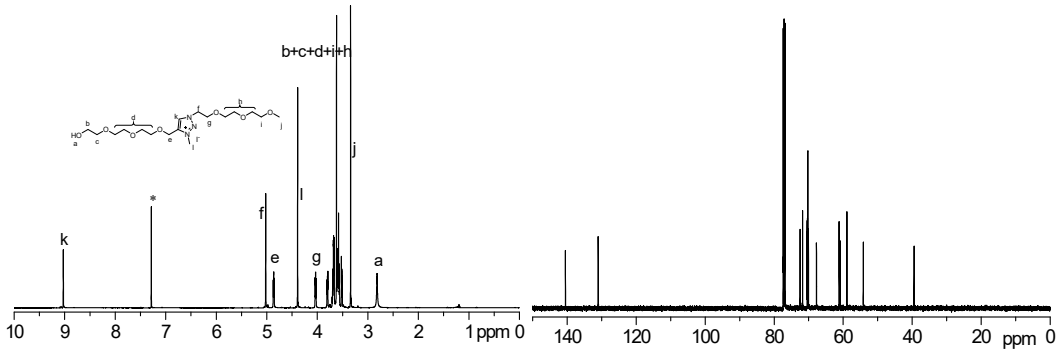

Fig. S8 ^{1}H NMR and ^{13}C NMR spectra of compound **7** ($CDCl_3$)

NMR data for compound **7.** ^{1}H NMR (500 MHz, $CDCl_3$): δ 9.03 (1H, triazole-*H*), 5.02 (2H, -N=N-N-C*H*$_2$CH$_2$O-), 4.85 (2H, -N=N-CC*H*$_2$O-), 4.38 (3H, triazole-C*H*$_3$), 4.02 (2H, -N=N-NCH$_2$C*H*$_2$O-), 3.79-3.52 (20H, -C*H*$_2$O-), 3.34 (3H, -OC*H*$_3$), 2.82 (-O*H*). ^{13}C NMR (125 MHz, $CDCl_3$) δ 140.49, 131.00, 72.50, 71.78, 70.47, 70.41, 70.38, 70.33, 70.26, 70.07, 67.74, 61.17, 60.91, 58.94, 54.17, 39.46.

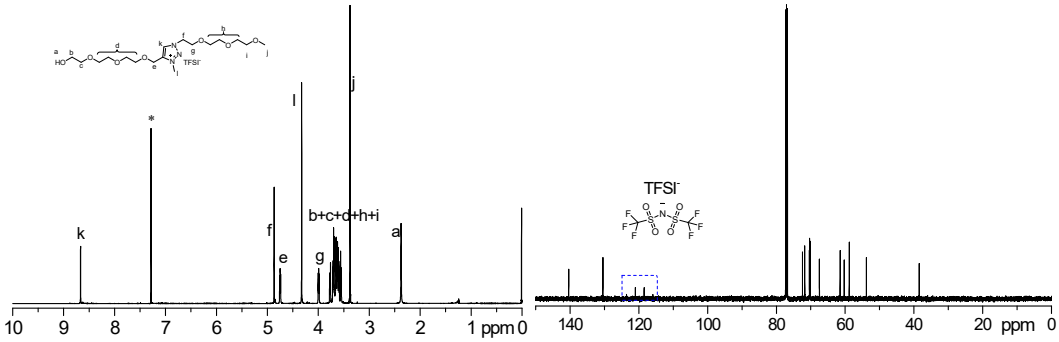

Fig. S9 ^{1}H NMR and ^{13}C NMR spectra of compound **T2** ($CDCl_3$)

NMR data for compound **T2.** ^{1}H NMR (500 MHz, $CDCl_3$): δ 8.67 (1H, triazole-*H*), 4.87 (2H, -N=N-N-C*H*$_2$CH$_2$O-), 4.75 (2H, -N=N-CC*H*$_2$O-), 4.33 (3H, triazole-C*H*$_3$), 3.99 (2H, -N=N-NCH$_2$C*H*$_2$O-), 3.77-3.55 (20H, -C*H*$_2$O-), 3.38 (3H, -OC*H*$_3$), 2.38 (-O*H*). ^{13}C NMR (125 MHz, $CDCl_3$) δ 140.41, 130.46, 123.57, 121.02, 118.47, 115.80, 72.42, 71.75, 70.41, 70.35, 70.32, 70.31, 70.20, 70.18, 70.10, 67.49, 61.47, 60.29, 58.82, 53.83, 38.47.

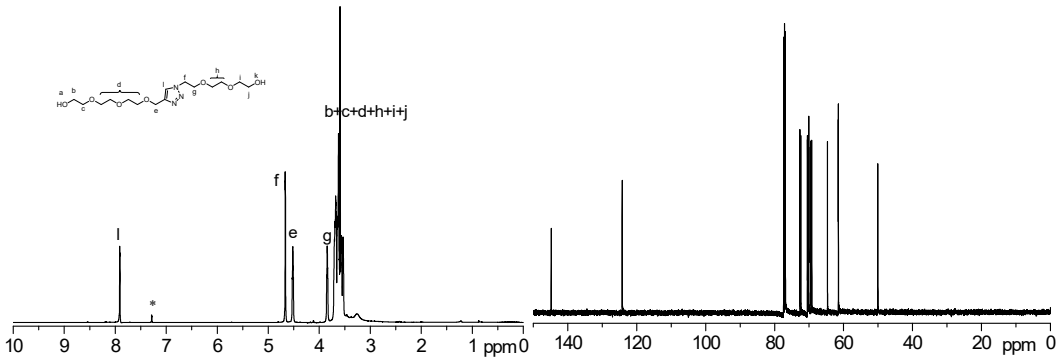

Fig. S10 ^{1}H NMR and ^{13}C NMR spectra of compound **9** ($CDCl_3$)

NMR data for compound **9.** ^{1}H NMR (500 MHz, $CDCl_3$): δ 7.91 (1H, triazole-*H*), 4.67 (2H, -N=N-N-CH_2CH$_2$O-), 4.52 (2H, -N=N-CCH_2O-), 3.84 (2H, -N=N-NCH$_2$CH_2O-), 3.70-3.53 (20H, -CH_2O-). ^{13}C NMR (125 MHz, $CDCl_3$) δ 144.80, 124.21, 72.64, 72.43, 70.50, 70.45, 70.37, 70.14, 70.10, 69.46, 69.24, 64.67, 61.52, 61.49, 50.08.

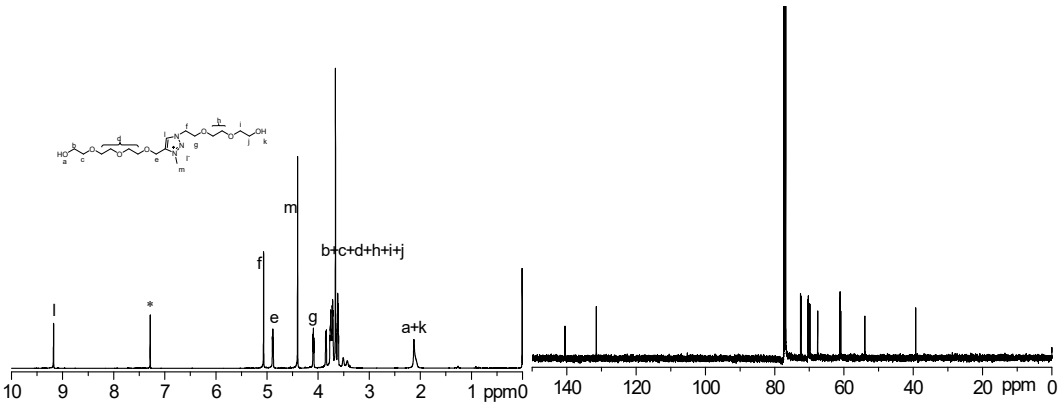

Fig. S11 ^{1}H NMR and ^{13}C NMR spectra of compound **10** ($CDCl_3$)

NMR data for compound **10.** ^{1}H NMR (500 MHz, $CDCl_3$): δ 9.18 (1H, triazole-*H*), 5.07 (2H, -N=N-N-CH_2CH$_2$O-), 4.88 (2H, -N=N-CCH_2O-), 4.40 (3H, triazole-CH_3), 4.10 (2H, -N=N-NCH$_2$CH_2O-), 3.85-3.43 (20H, -CH_2O-), 2.13 (-O*H*). ^{13}C NMR (125 MHz, $CDCl_3$) δ 140.51, 131.47, 72.54, 72.45, 70.43, 70.35, 70.29, 70.27, 70.03, 69.85, 67.60, 61.24, 61.15, 60.94, 53.99, 39.31.

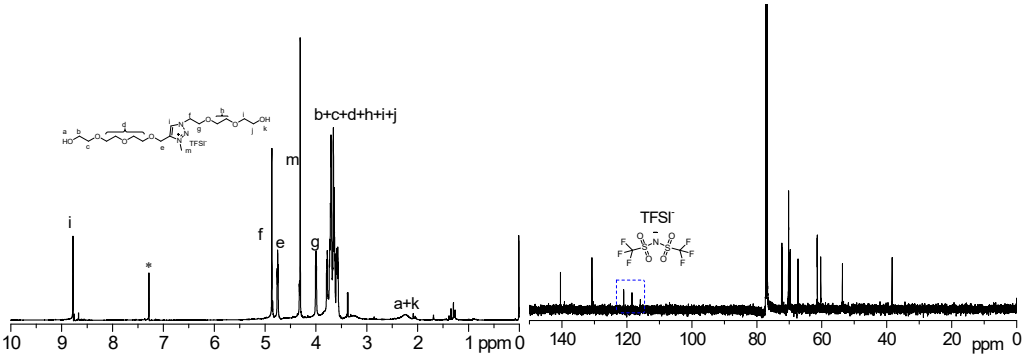

Fig. S12 ^{1}H NMR and ^{13}C NMR spectra of compound **T3** ($CDCl_3$)

NMR data for compound **T3.** ^{1}H NMR (500 MHz, $CDCl_3$): δ 8.78 (1H, triazole-*H*), 4.87 (2H, -N=N-N-CH_2CH$_2$O-), 4.74 (2H, -N=N-CCH_2O-), 4.31 (3H, triazole-CH_3), 3.99-3.57 (20H, -CH_2O-), 2.23 (-O*H*). ^{13}C NMR (125 MHz, $CDCl_3$) δ 140.46, 130.74, 123.32, 120.99, 118.40, 115.80, 72.37, 72.26, 70.23, 70.14, 69.90, 69.73, 67.31, 61.39, 61.37, 60.33, 53.66, 38.37.

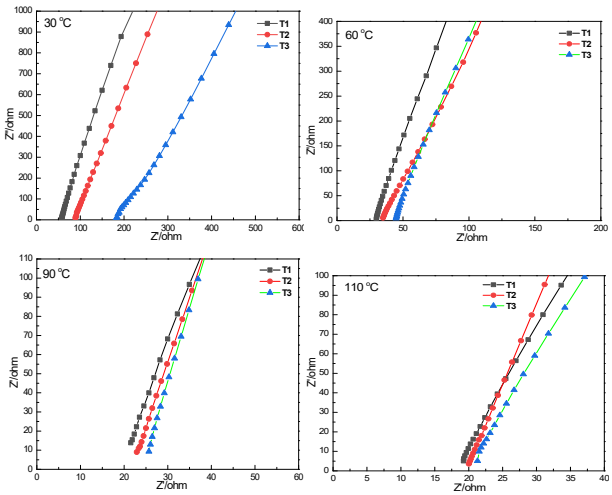

Fig. S13 Nyquist plots of **T1**, **T2** and **T3** versus temperature, measured by EIS from 30 to 110 °C.

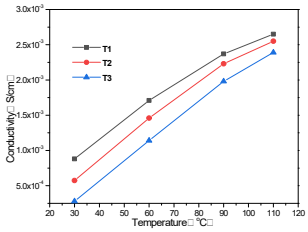

Fig. S14 Intrinsic ionic conductivity of **T1**, **T2** and **T3** versus temperature, measured by EIS from 30 to 110 °C.

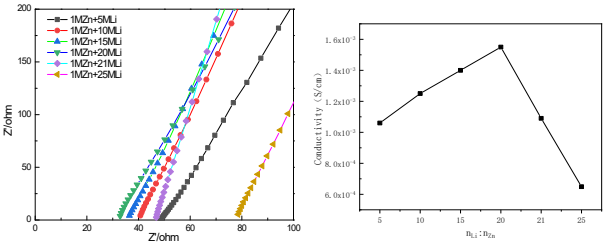

Fig. S15 Nyquist and conductivity diagram of **T1S-x** with salt proportion, measured by EIS at 30 °C.

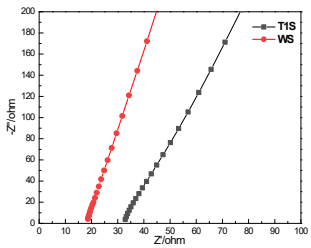

Fig. S16 Nyquist diagram of **T1S-20** and **WS-20** at 30 °C.