Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary

High Performance Solid Polymer Electrolyte with Graphene Oxide Nanosheets

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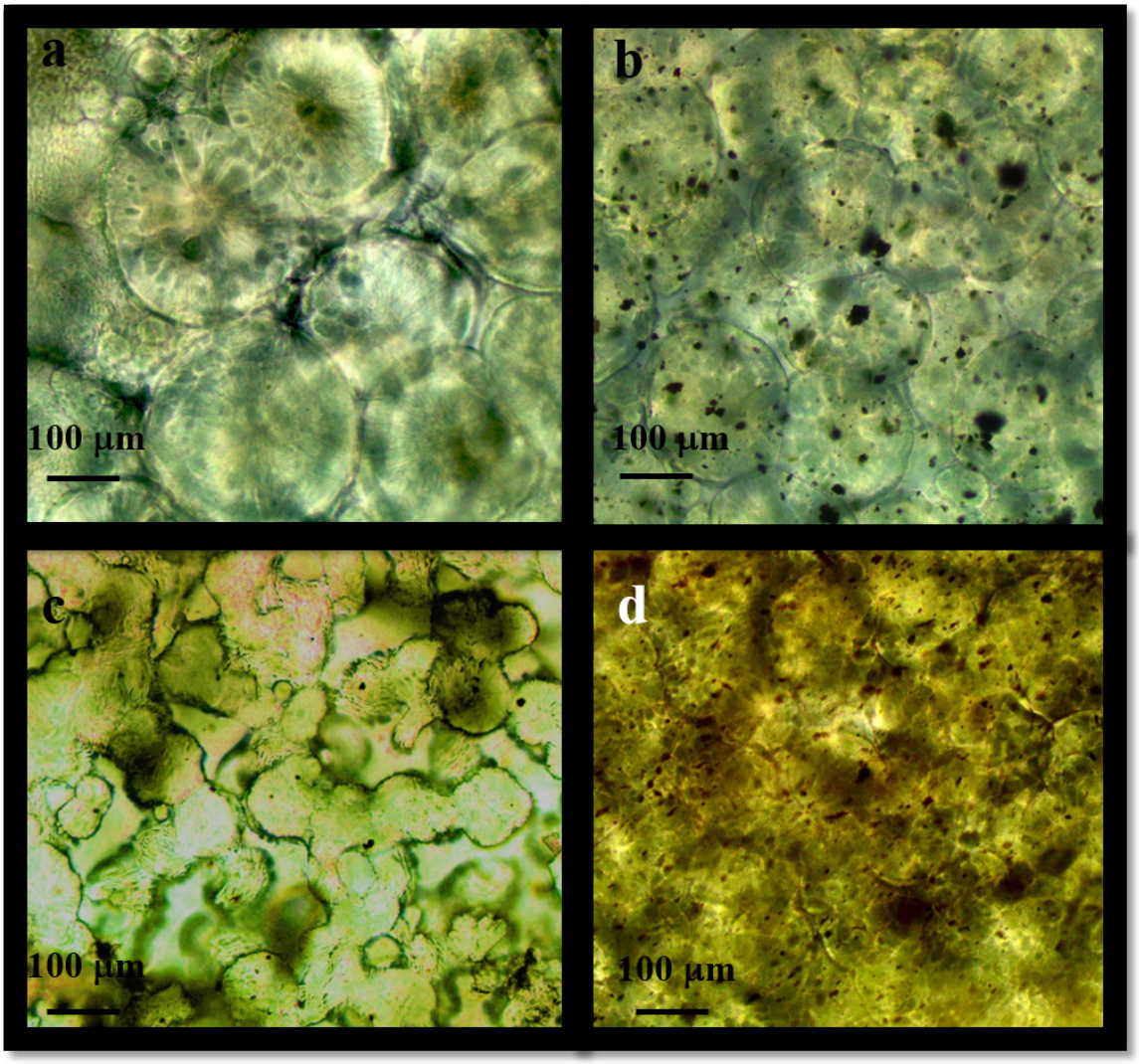

Figure S1 Polarized light microscopy (PLM) of a) filler-free polymer electrolyte b)0.5 wt. % GO c)1 wt. % GO and d)5 wt. % GO/PEO-Li polymer electrolyte

The ion conductivity σ of the PEO electrolytes was calculated using $\sigma = d / RS$ where R is the bulk resistance obtained from the Nyquist plots (Figure S1), and d and S are the thickness and area of the samples, respectively.

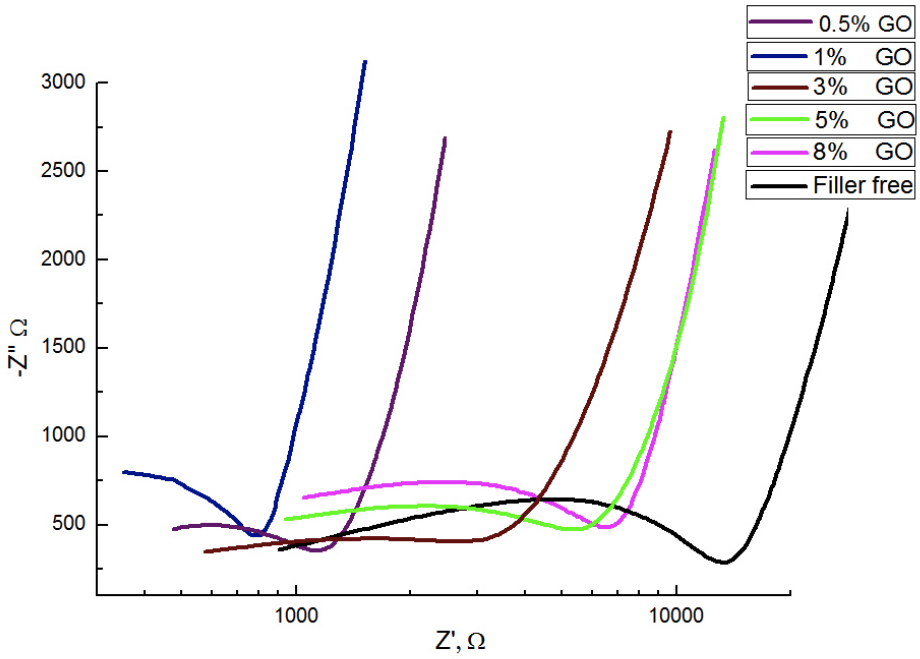

Figure S2 Nyquist (complex impedance) plots for pure and PEO/GO composite electrolytes (film thickness: 0.0203 cm, film area: 2.84 cm^2)

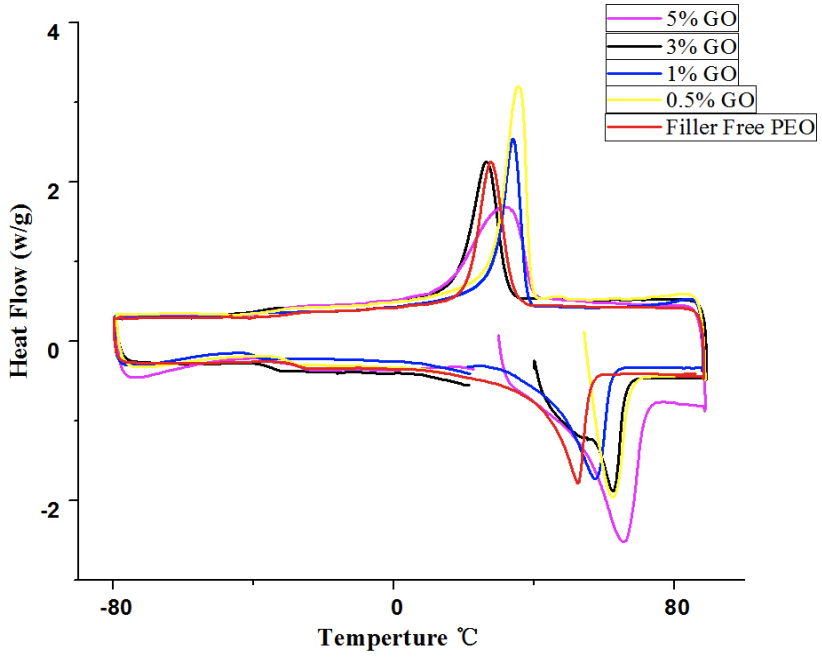

Figure S3 Differential Scanning Calorimetry (DSC) of pure and PEO/GO composite electrolytes

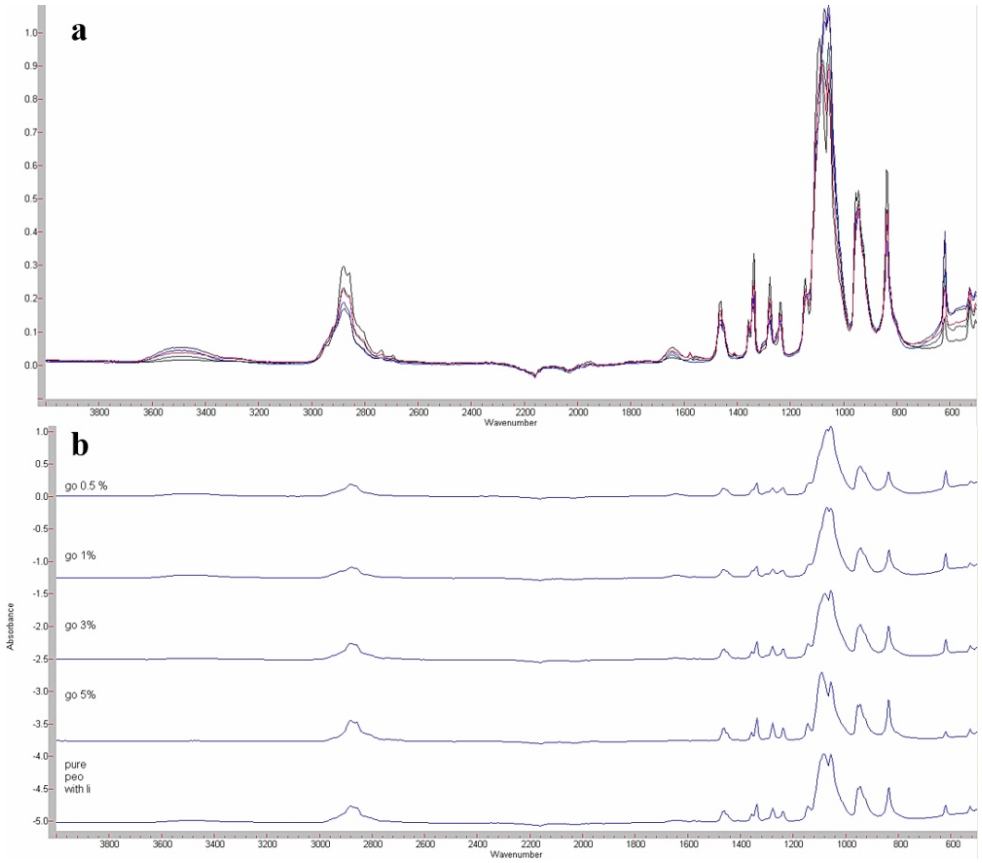

Figure S4 Fourier Transform Infrared (FTIR) spectra of pure and PEO/GO composite electrolytes: a) combined, b) shown separately.

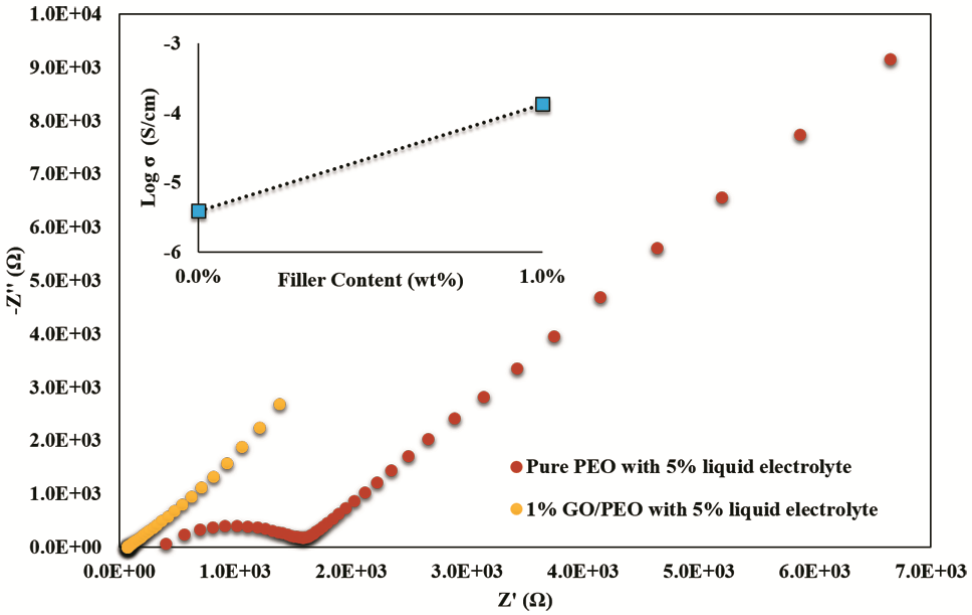

Figure S5 Complex impedance spectra of pure PEO and PEO/1%GO both with 5% liquid plasticizer and the respective ion conductivities (inset) (film thickness: 0.025cm, film area: 2.84 cm^2)

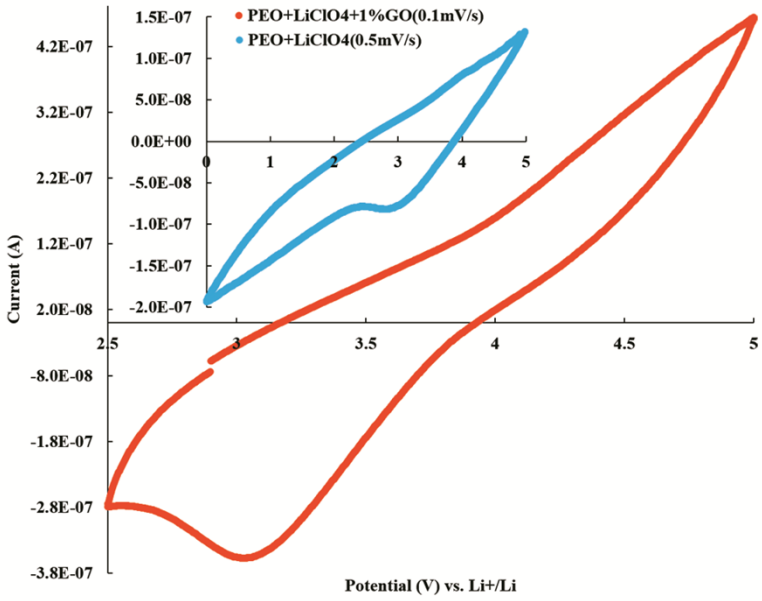

Figure S6 Cyclic voltammetry (CV) of Li cobalt oxide vs. lithium metal with PEO/1%GO+LiClO4+plasticizer electrolyte at room temperature and CV for unfilled PEO (inset)

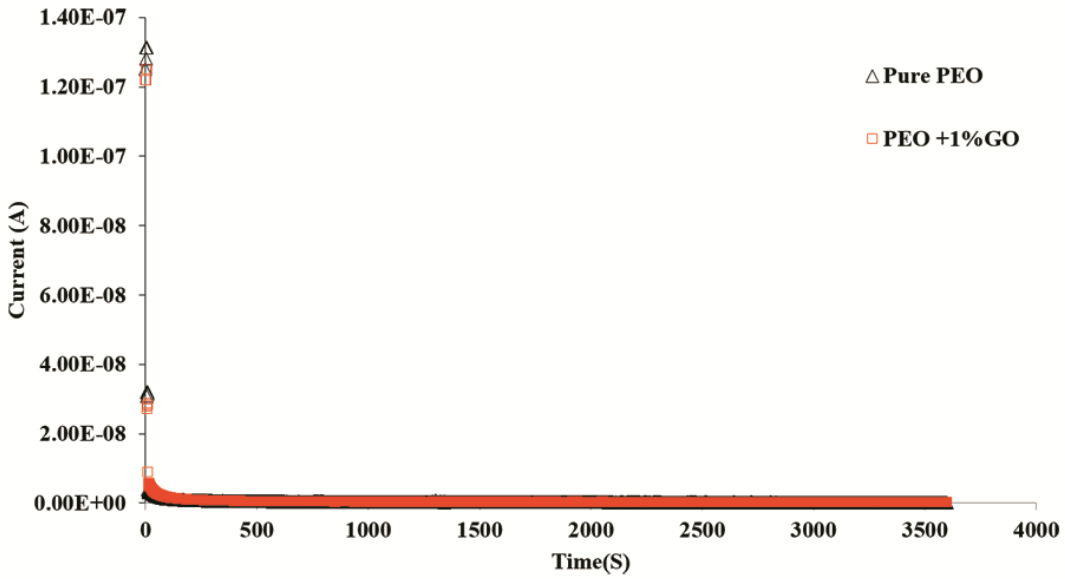

Figure S7 Polarization current curves of PEO and PEO/1%GO

Table S 1 Ionic/electronic transport numbers and electronic conductivities of PEO and PEO+1%GO estimated by DC polarization method

Samples	I_t (A)	I_e (A)	t_{ion} [(a)] (%)	t_{ele} [(b)] (%)	Ionic conductivity (S/cm)	Electrical conductivity (S/cm)
PEO	1.25E-07	1.08E-10	99.91%	0.087%	4.06E-07	3.52E-10
PEO+1% GO	1.22E-07	2.92E-10	99.76%	0.239%	2.35E-05	5.62E-08

[(a)] t_{ion} (%) = 100(It-Ie)/It.;[(b)] t_{ele} (%) = 100Ie/It.