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Supporting Information

A Novel All-Solid Electrolyte Based on Co-polymer of Poly-(Methoxy/Hexadecal-Poly(Ethylene Glycol) Methacrylate) for Lithium-ion Cell

Xiang Zuo,[a] Xiao-Min Liu,[a] Feng Cai,[a] Hui Yang,[a,*] Xiao-Dong Shen[a,*] and Gao Liu[b]

[a] College of Materials Science and Engineering, Nanjing University of Technology, 5 Xinmofan Road, Nanjing, Jiangsu, 210009, P. R. China

[b] Environmental Energy Technologies Division, Lawrence Berkeley National Laboratory, 1 Cyclotron Rd., Berkeley, CA, 94720, USA

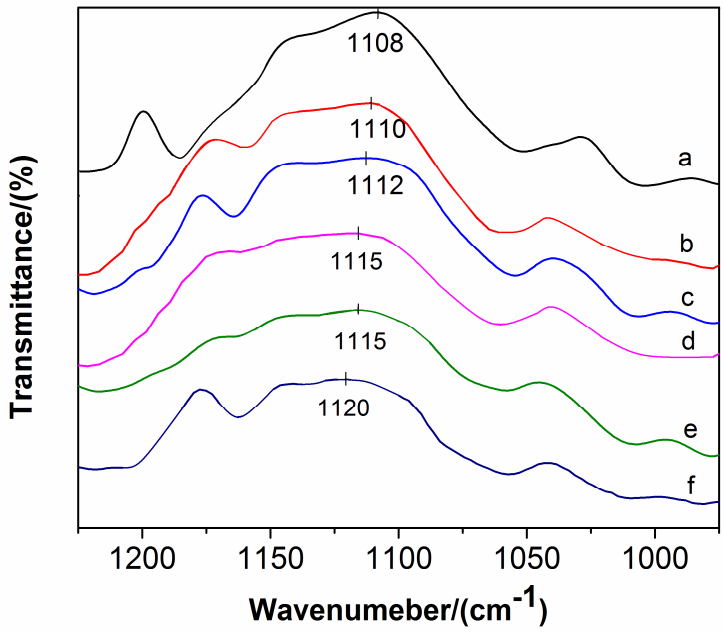

Fig. S1 IR spectra of the C–O–C groups in different polyethylene glycol derivatives (chemical structures shown in Table 1).

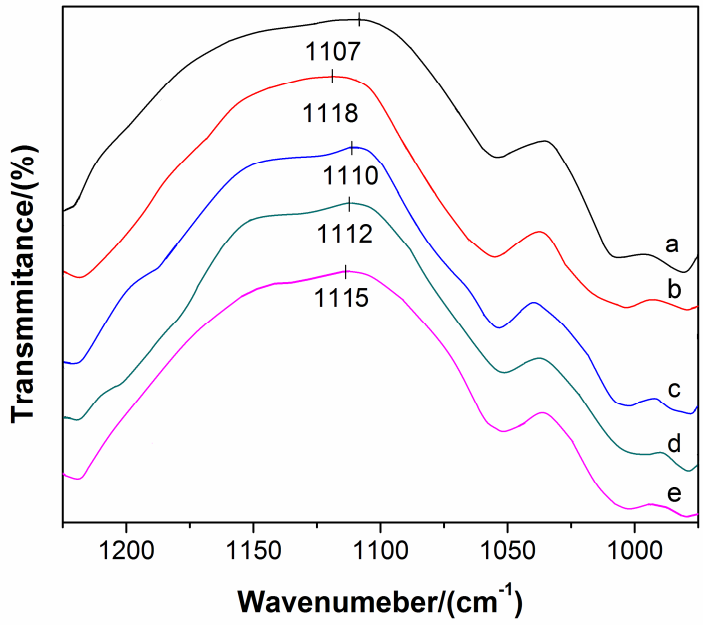

Fig. S2 IR spectra of the C–O–C groups in polymers. (a) PMPEGM (n=7), (b) PHPEGM, (c) PMH_7-20, (d) PMH_7-40, (e) PMH_7-60.

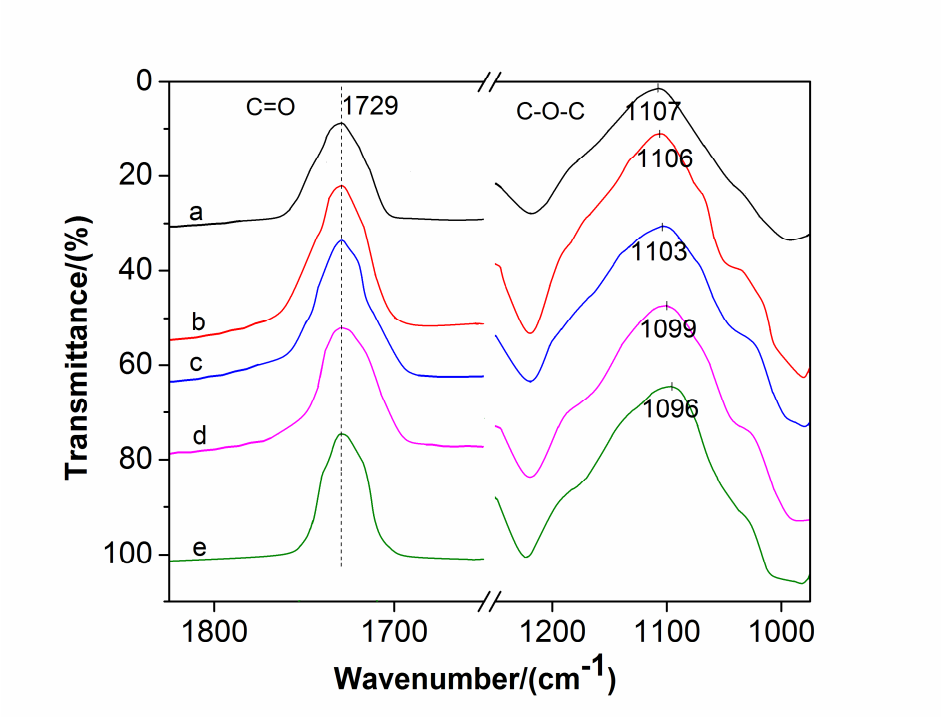

Fig. S3 IR spectra of the C–O–C and C=O group in electrolytes. (a) PMH_7-20 ([Li]:[EO] =1:30), (b) PMH_7-20 ([Li]:[EO] =1:25), (c) PMH_7-20 ([Li]:[EO] =1:20), (d) PMH_7-20 ([Li]:[EO] =1:15), (e) PMH_7-20 ([Li]:[EO] =1:10).

Thermal stability

The thermal stability of the polymers and electrolyte is analyzed by TGA and shown in Fig S4. The decomposition temperature of the neat PMH_{12}-25 polymer is 360.0 °C. When lithium salt are introduced, the degradation temperature of PMH_{12}-25 is 277.9 °C. This behavior may be attributed to the weakening of the C-O-C bond and reduction in electronic density, caused by the coordination of ether oxygen with Li^+. There is no obvious weight loss until the temperature reaches than 200 °C. Therefore, the polymer electrolyte based on PMH_{12}-25 seems to be promising for the practical lithium polymer batteries.

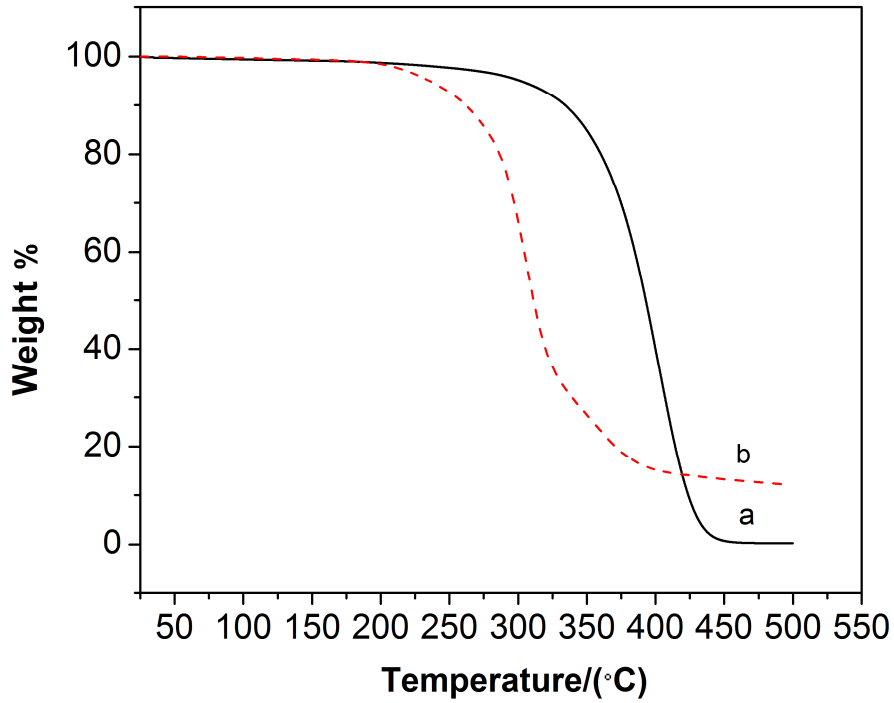

Fig. S4 TGA curves for the polymer and electrolyte. (a)PMH_{12}-25, (b)PMH_{12}-25 ([Li]:[EO] =1:20).