Supporting Information

A PEO-based Gel Polymer Electrolyte for Lithium Ion Batteries

Wangyu Li, Ying Pang, Jingyuan Liu, Guanghui Liu, Yonggang Wang, Yongyao Xia*

Department of Chemistry and Shanghai Key Laboratory of Molecular Catalysis and Innovative Materials, Institute of New Energy, Fudan University, Shanghai, 200433, China.

Preparation of gel electrolyte

Polyethylene oxide (PEO) (Mw=60,000) and LB303 were mixed together to form a solution A. 2-hydroxy-2-methyl-1-phenyl-1-propanone (0.01 g) was added to trimethylolpropane ethoxylate triacrylate (3 g) to form Solution B. The two kinds of solution were mixed together to form the precursor. Then the precursor solution was exposed to UV irradiation (wavelength of 365 nm) for ~10 s. A solidified and flexible gel electrolyte was obtained. All samples were processed and prepared in an argon-filled glove box. For comparison, different content of liquid electrolyte or ionomer was used to preparation. GPE-0: 0.2 g PEO, 4 g LB303, 0.01 g 2-hydroxy-2-methyl-1-phenyl-1-propanone and 3 g trimethylolpropane ethoxylate triacrylate. GPE-1: 0.1 g PEO, 4 g LB303, 0.01 g 2-hydroxy-2-methyl-1-phenyl-1-propanone and 3 g trimethylolpropane ethoxylate triacrylate. GPE-2: 0.05 g PEO, 4 g LB303, 0.01 g 2-hydroxy-2-methyl-1-phenyl-1-propanone and 3 g trimethylolpropane ethoxylate triacrylate. GPE-3: 0.1 g PEO, 2 g LB303, 0.01 g 2-hydroxy-2-methyl-1-phenyl-1-propanone and 3 g trimethylolpropane ethoxylate triacrylate.
propanone and 3 g trimethylolpropane ethoxylate triacrylate.
Fig. S1 IR spectra and XRD of the gel polymer electrolyte

Fig. S2 EIS plots of SS/liquid/SS at room temperatures

Fig. S3 a) Chronoamperometry profiles for the GPE at 25 °C in block cells using Li
metal as both electrodes with step potential of 10 mV. b) Nyquist profiles of the cell
electrochemical impedance spectroscopy response before and after polarization

![Graph showing cycling performance](Fig.S4)

**Fig.S4** Cycling performance of LiFePO$_4$/liquid electrolyte/Li battery at current density

of 0.5C