Supporting Information

A PEO-based Gel Polymer Electrolyte for Lithium Ion Batteries

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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.

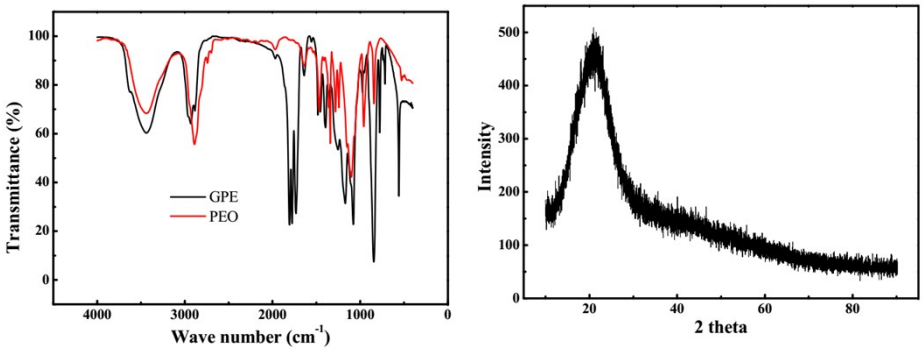

Fig.S1 IR spectra and XRD of the gel polymer electrolyte

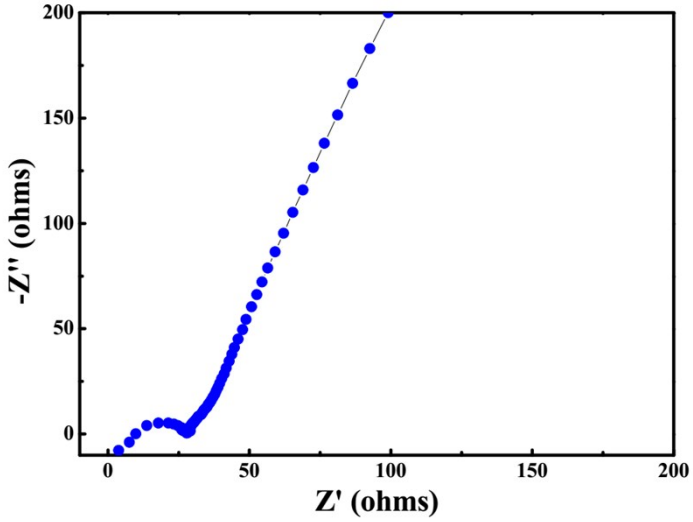

Fig.S2 EIS plots of SS/liquid/SS at roomtemperatures

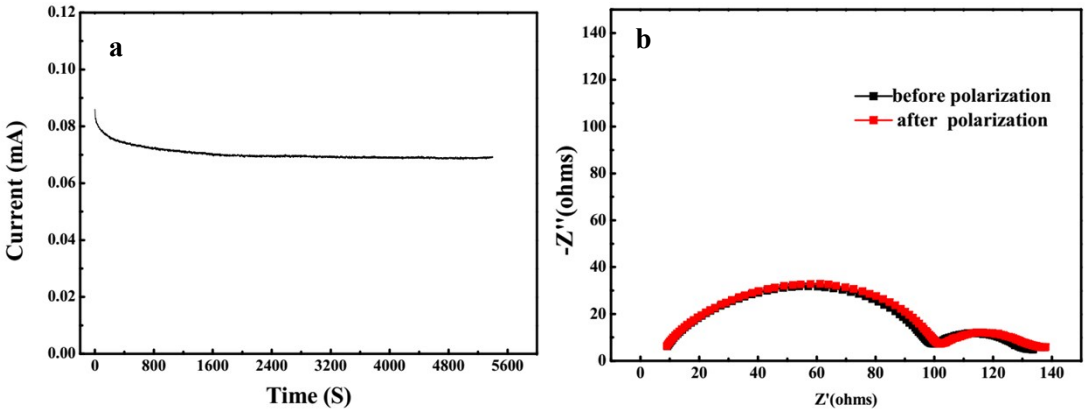

Fig.S3 a) Chronoamperometry profiles for the GPE at 25 ℃ in block cells using Li

metal as both electrodes with step potential of 10 mV. b) Nyquist profiles of the cell electrochemical impedance spectroscopy response before and after polarization

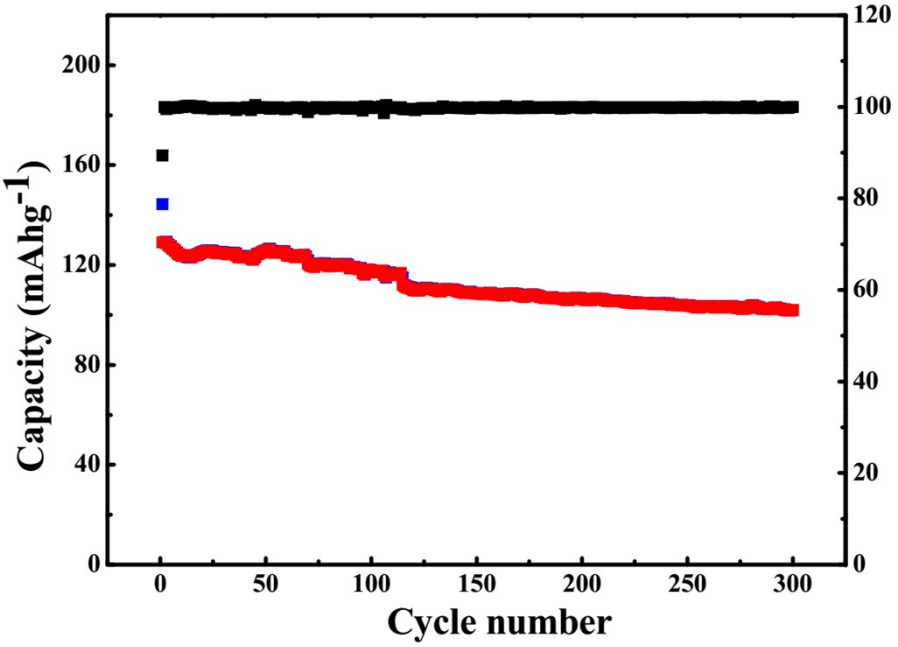

Fig.S4 Cycling performance of $LiFePO_4$/liquid electrolyte/Li battery at current density of 0.5C