

Enhanced electrolyte-electrode surface area using a gel polymer electrolyte for high performance flexible energy storage

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A good surface area of between electrode and electrolyte, especially solid state electrolyte, is important for high-performance energy storages. Here we synthesize gel polymer electrolytes (GPEs) consisting of poly(ethylene glycol) methyl ether methacrylate (PEGMA) and trimethylolpropane ethoxylate triacrylate (ETPTA) with a lithium salt solution (1M LiPF₆ EC/DMC) by UV irradiation. Ionic conductivity and mechanical stability are controlled by changing the composition of PEGMA and ETPTA as well as the content of lithium salt solution in the polymer. The GPEs with high ionic conductivity ($\sim 10^{-3}$ S/cm) is impregnated into carbon based electrodes which can improve electrolyte-electrode surface area. While the GPEs with comparatively large mechanical strength and small ionic conductivity ($\sim 10^{-4}$ S/cm) can be used as both separator and electrolyte, giving flexible solid energy storage devices.