

Electronic Supplementary Information

UV-cured Eutectic Gel Polymer Electrolytes for Safe and Robust Li-ion Batteries

Matthew W. Logan, Spencer Langevin, Bing Tan, Adam W. Freeman, Christopher Hoffman Jr.,
Douglas B. Trigg, and Konstantinos Gerasopoulos*

Research and Exploratory Development Department, Johns Hopkins University Applied Physics
Laboratory, 11000 Johns Hopkins Rd, Laurel, MD, 20773

*corresponding author: konstantinos.gerasopoulos@jhuapl.edu

Supporting Figures

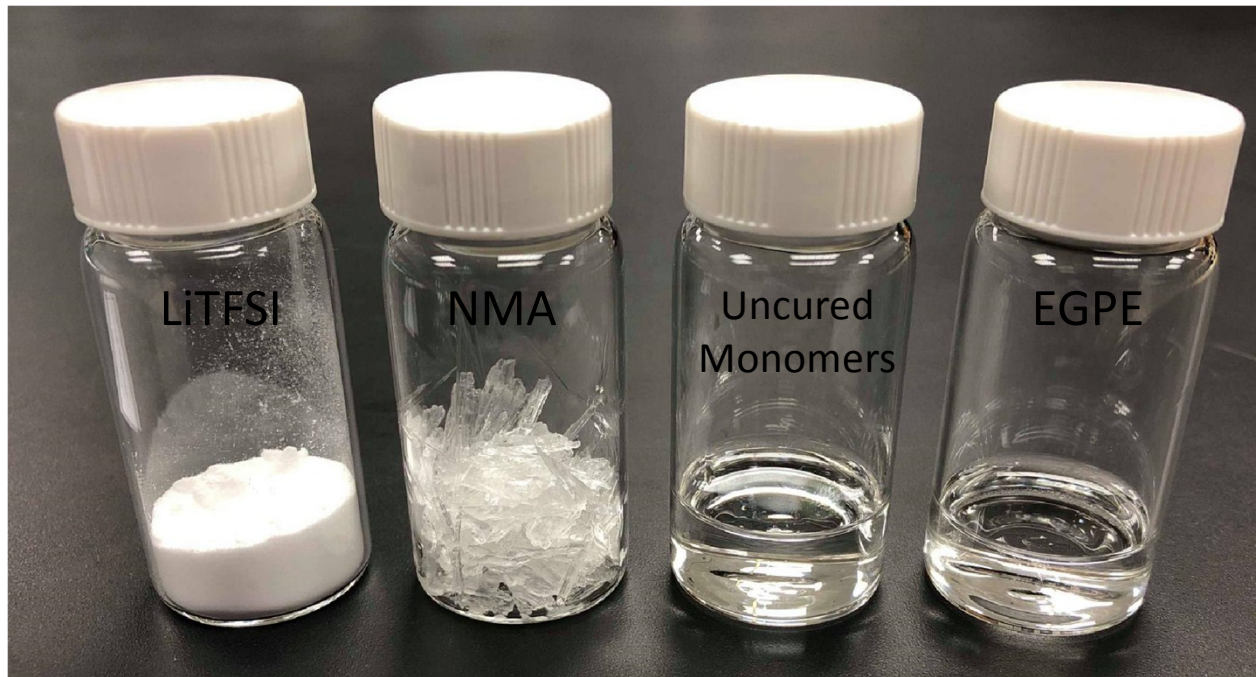


Figure S1: Optical images of LiTFSI, NMA, uncured polymer monomers, and cured EGPE-2 electrolyte

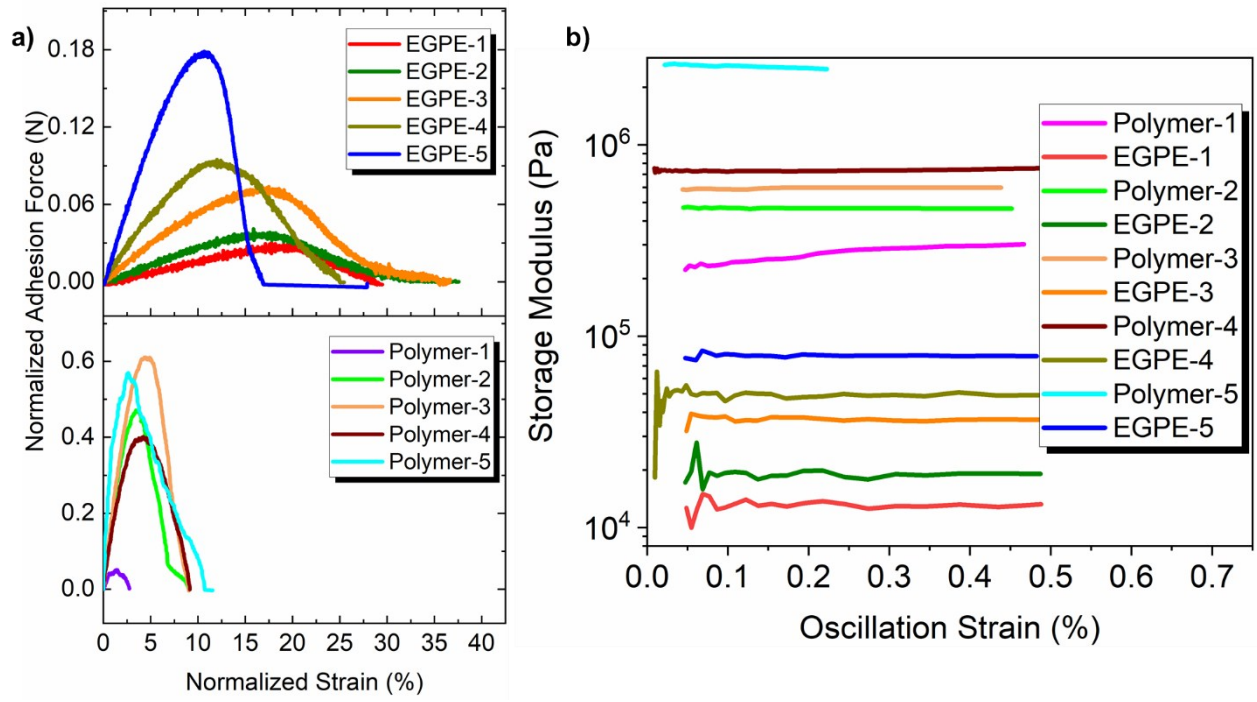


Figure S2: a) axial adhesion force for the neat polymers and EGPEs and b) storage modulus for the neat polymers and EGPEs

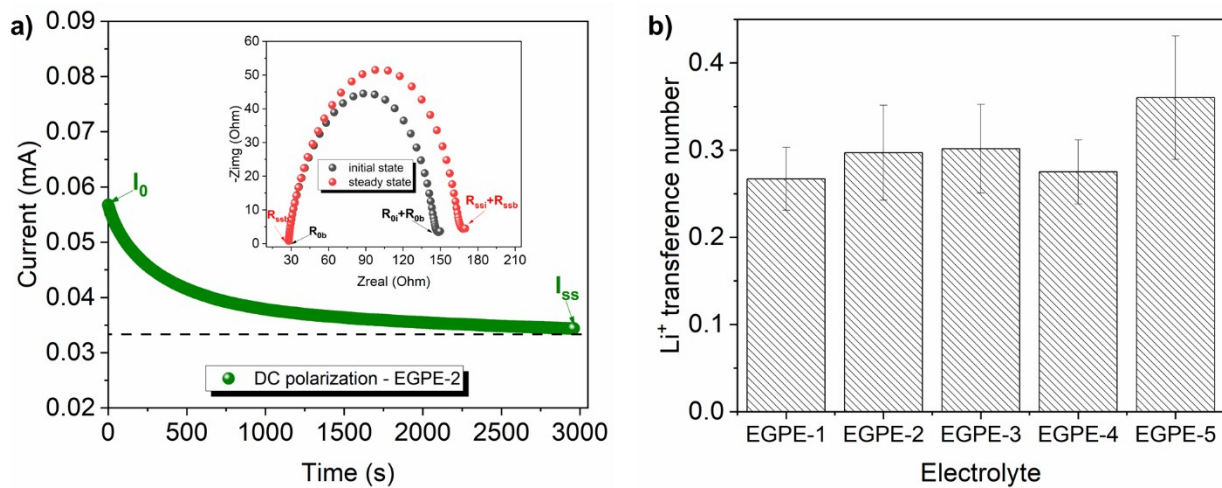
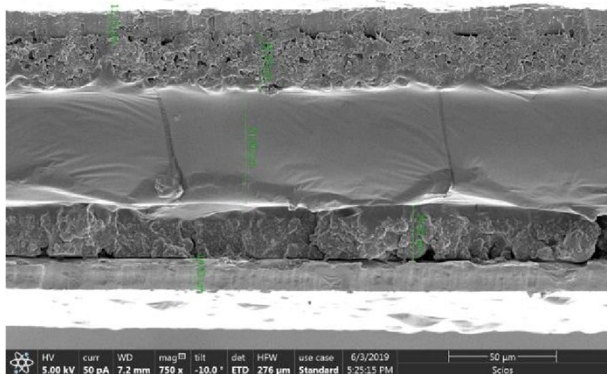


Figure S3: a) characteristic DC polarization curve and EIS spectra (inset) before and after polarization (for EGPE-2); b) Li^+ transference number for all EGPEs

a)



b)

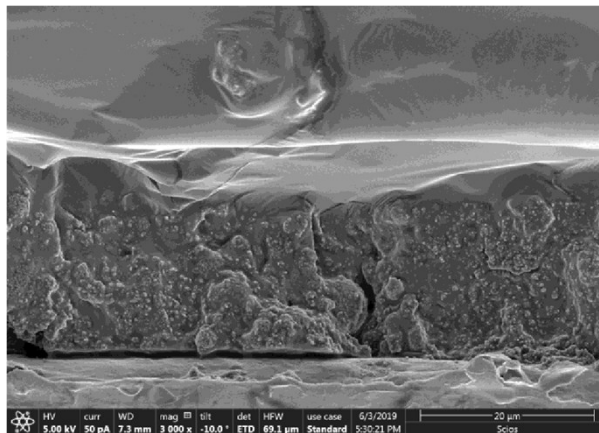


Figure S4: SEM images of EGPE-4 cell after testing. Even though as cured thicknesses are on the order of 100 microns on either side, cell crimping changes the final thickness. The variation is attributed to differences in pressure as well as curing morphology. B) Higher magnification SEM images show excellent electrolyte penetration inside the porous electrode.

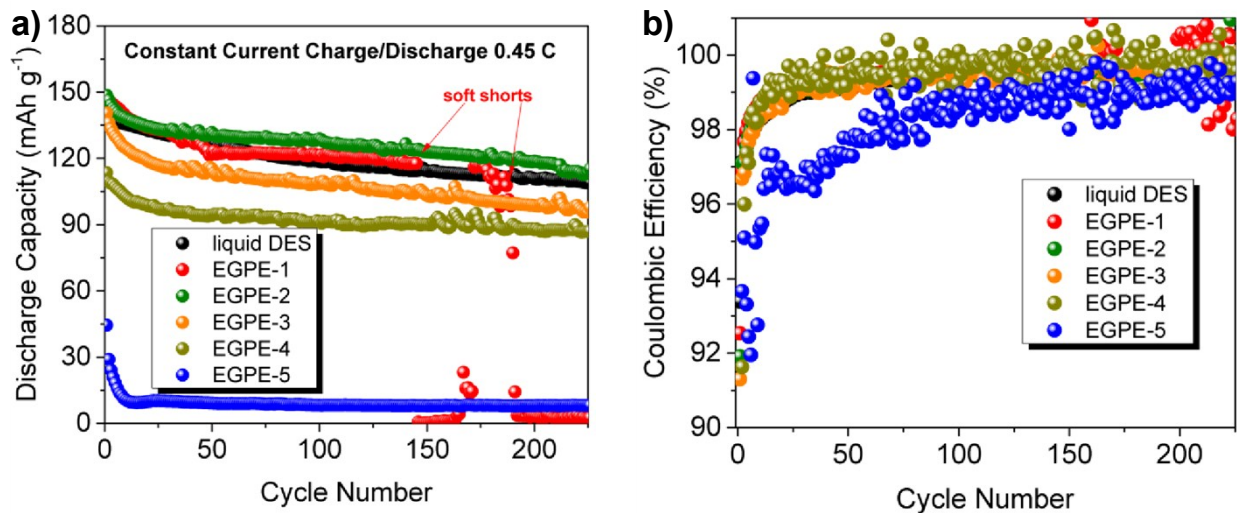


Figure S5: Cycle life of all EGPEs evaluated in present study and liquid DES: a) discharge capacity and b) coulombic efficiency vs. cycle life in LTO/LMO full cells built in a dry room

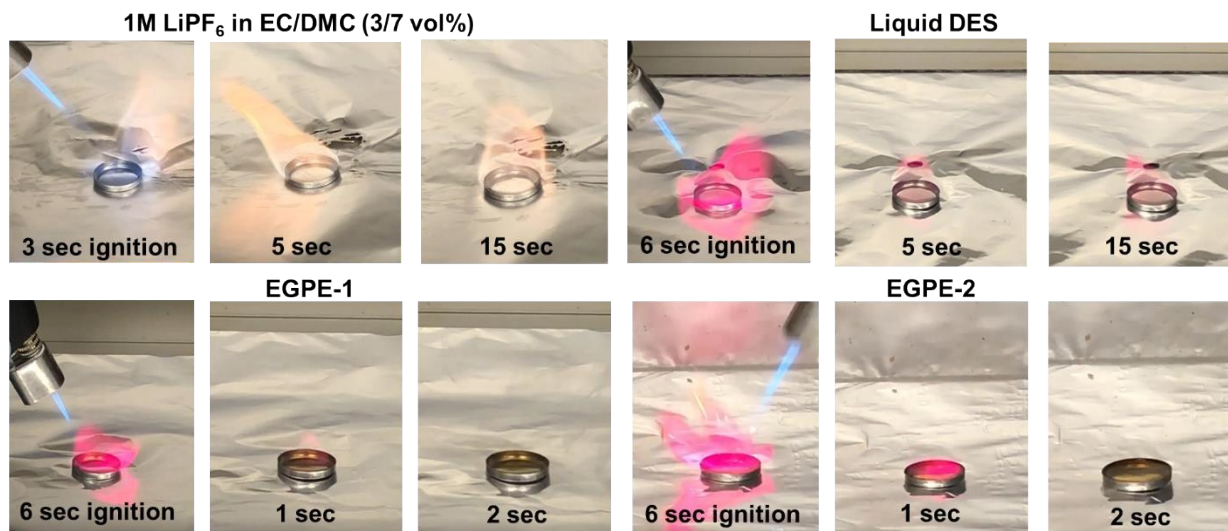


Figure S6: Optical images showing the ignition of a standard organic electrolyte control (1M LiPF₆ in EC/DMC), the liquid DES, and EGPE-1 and EGPE-2.

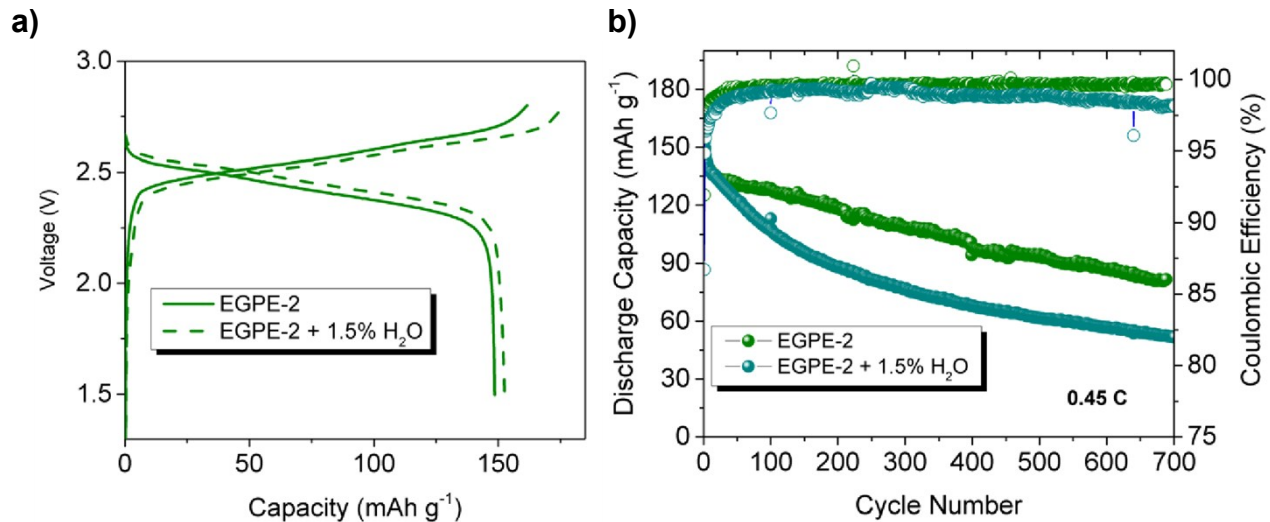


Figure S7: The effect of water on EGPE-2 to the a) first cycle charge/discharge profile and b) discharge capacity and coulombic efficiency vs. cycle number for LTO/LMO full cells spiked with 1.5% water. These cells were built in a N₂ filled dry box.

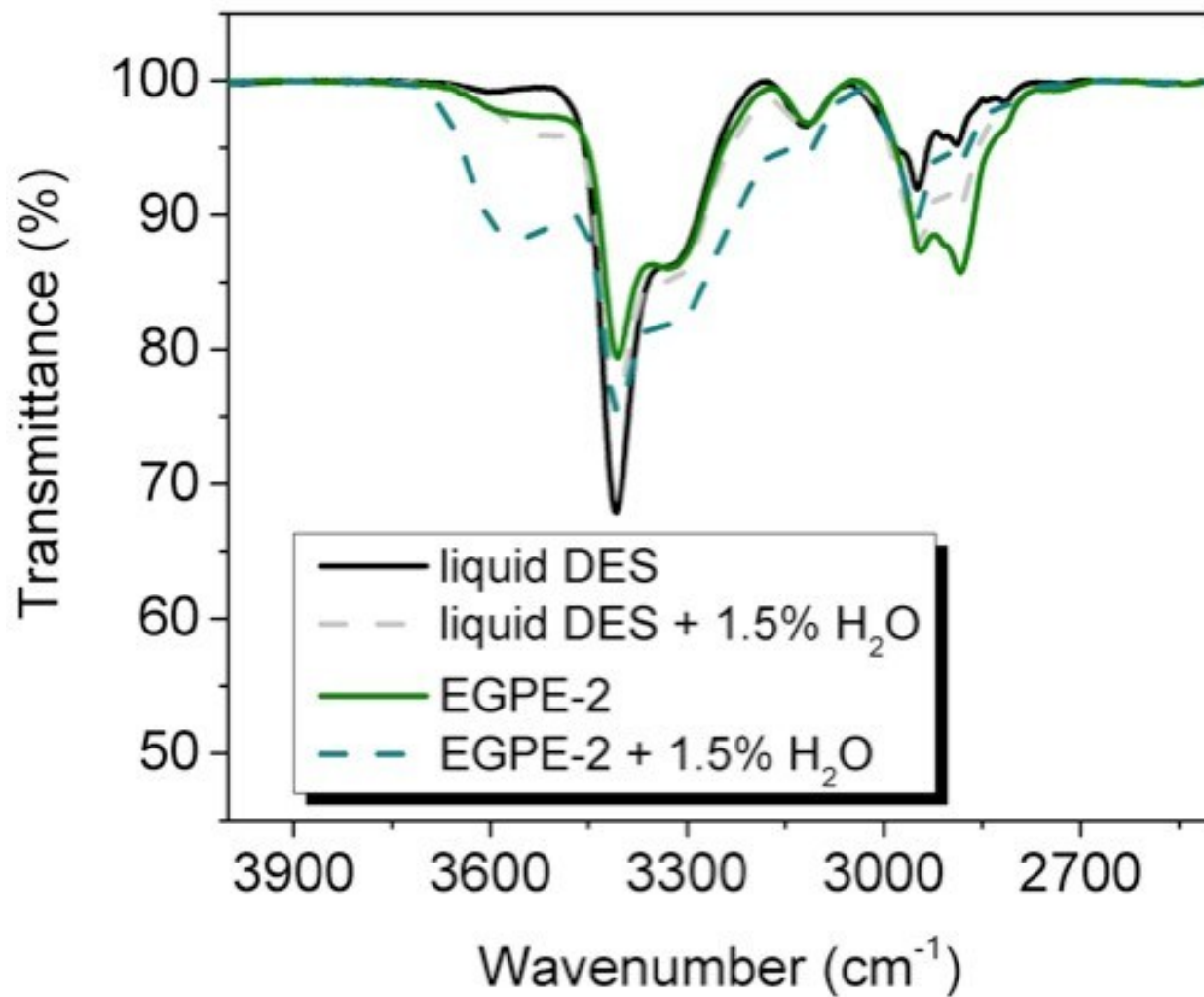


Figure S8: FTIR data for EGPE-2 and liquid DES with and without added water.

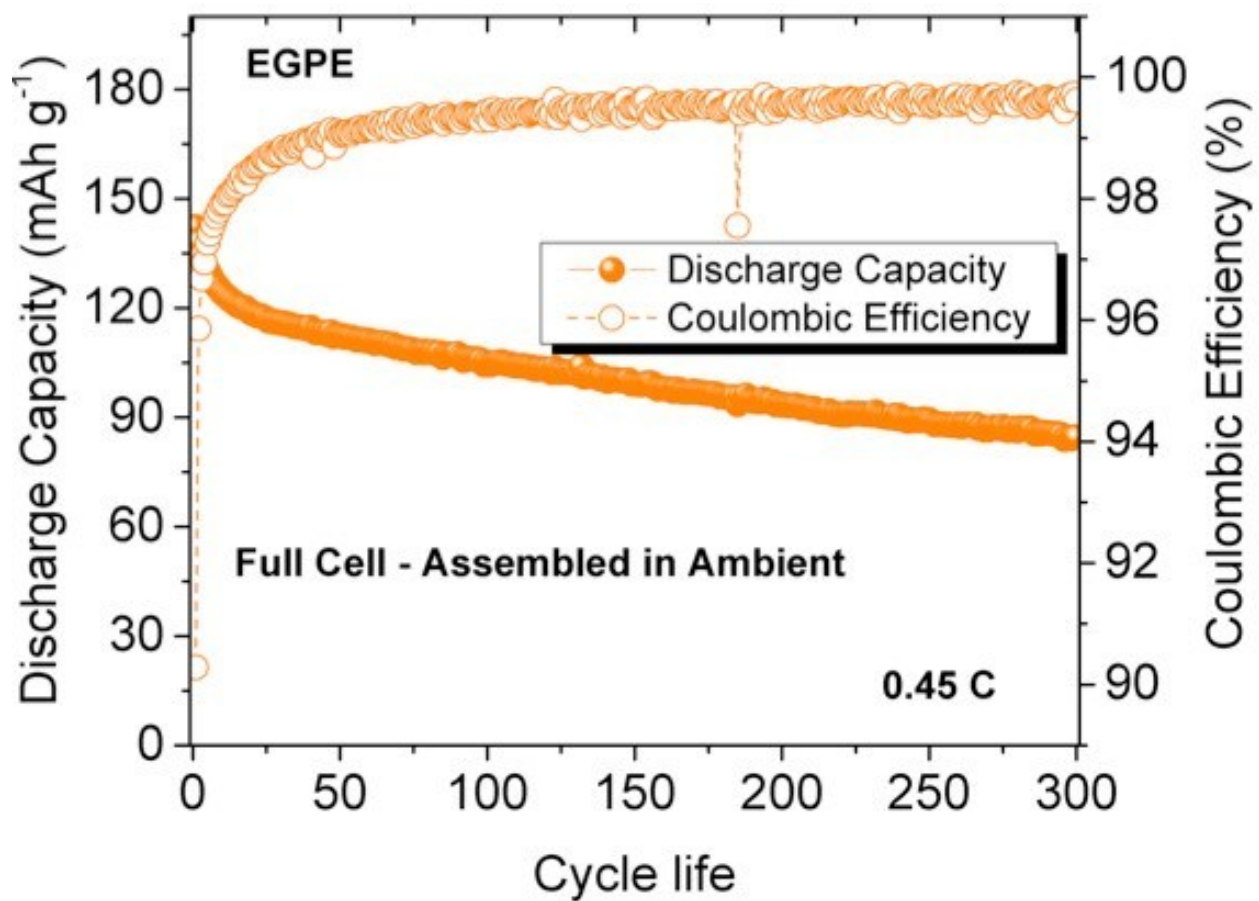


Figure S9: Discharge capacity and coulombic efficiency vs. cycle number for LTO/LMO full cells made in ambient conditions with EGPE-2.