Supporting Information

Solid State Energy Storage Device with Supercapacitor-Battery Hybrid Design

Jiaqi Dai,[1,a] Kun Fu,[1,a] Ramesh Palanisamy,[3] Amy Gong,[1] Glenn Pastel,[1] Robert Kornfeld,[1] Hongli Zhu,[1] Mohan Sanghadasa,[2,*] Elena Bekyarova,[3,*] Liangbing Hu[1,*]

1. Department of Materials Science and Engineering, University of Maryland, College Park, Maryland, 20742
2. Aviation and Missile Research Development, and Engineering Center, US Army RDECOM, Redstone Arsenal, Alabama, 35898
3. Carbon Solutions Inc, Riverside, California, 92507

[*]Email: binghu@umd.edu, bekyarova@carbonsolution.com, mfmohan.sanghadasa.civ@mail.mil

[a] These authors contributed equally to this work

In order to obtain electrochemical impedance spectroscopy (EIS) data of the integrated Al leaf/ LFP cathode, the cathode was assembled into coin cells with lithium metal as the counter electrode and PVdF-HFP gel electrolyte. The coin cells were scanned from 1 MHz to 100 mHz with a perturbation amplitude of 50 mV with a Biologic VMP_3 Potentiostat. Figure S1 shows the EIS curve of the cathode half cell. The intersection of the impedance semi-circle with Z' axis was at 70.6 ohm•cm^2.

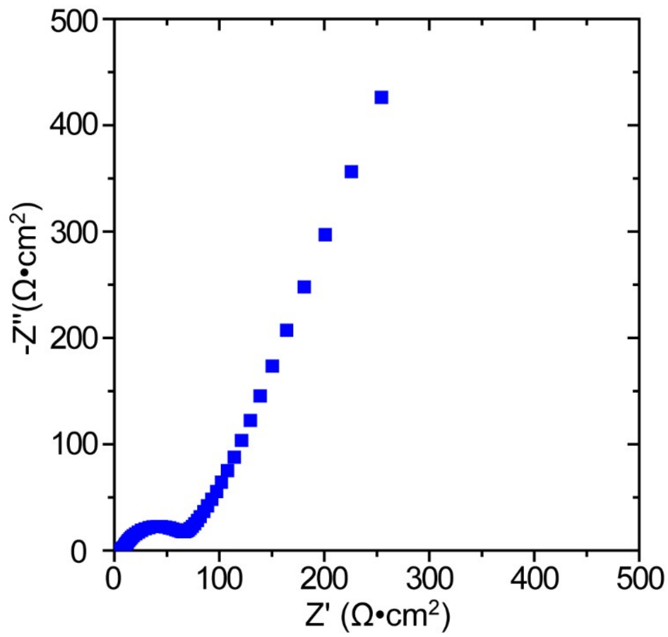

Figure S1. EIS curve of the integrated Al leaf/ LFP cathode in a half cell with lithium metal anode and PVdF-HFP gel electrolyte.

Figure S2 shows a scanning electron microscope (SEM) image of the PVdF-HFP membrane. The PVdF-HFP copolymer can be easily made into porous membranes with high porosity. The highly interconnected porous structure provides sufficient pathways for lithium ion transport.

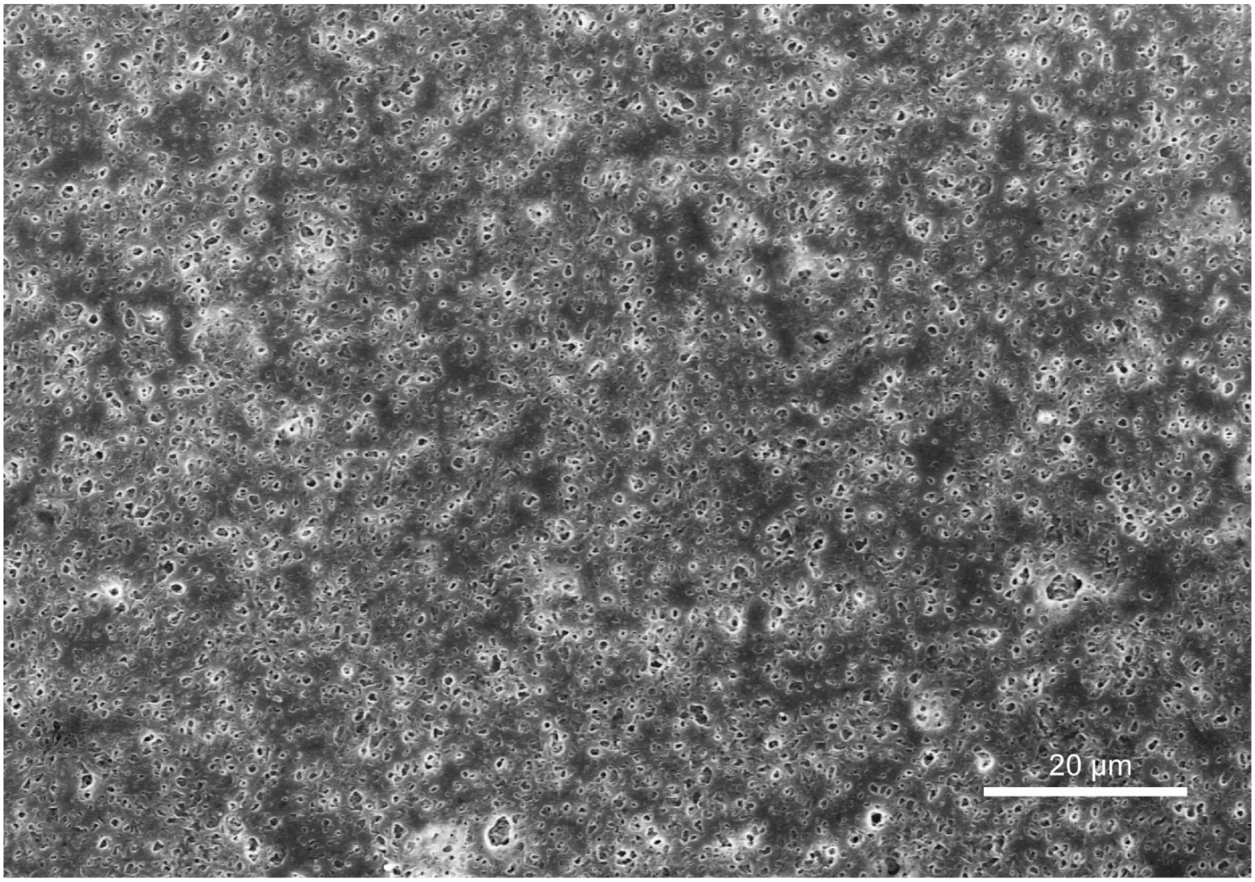

Figure S2. SEM image (top-view) of a piece of PVdF-HFP membrane shows the highly porous structure.