Electronic Supplementary Material (ESI) for RSC Applied Interfaces.

Ex-situ poly-DOL Coatings for Lithium Metal Protection

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Supporting Information

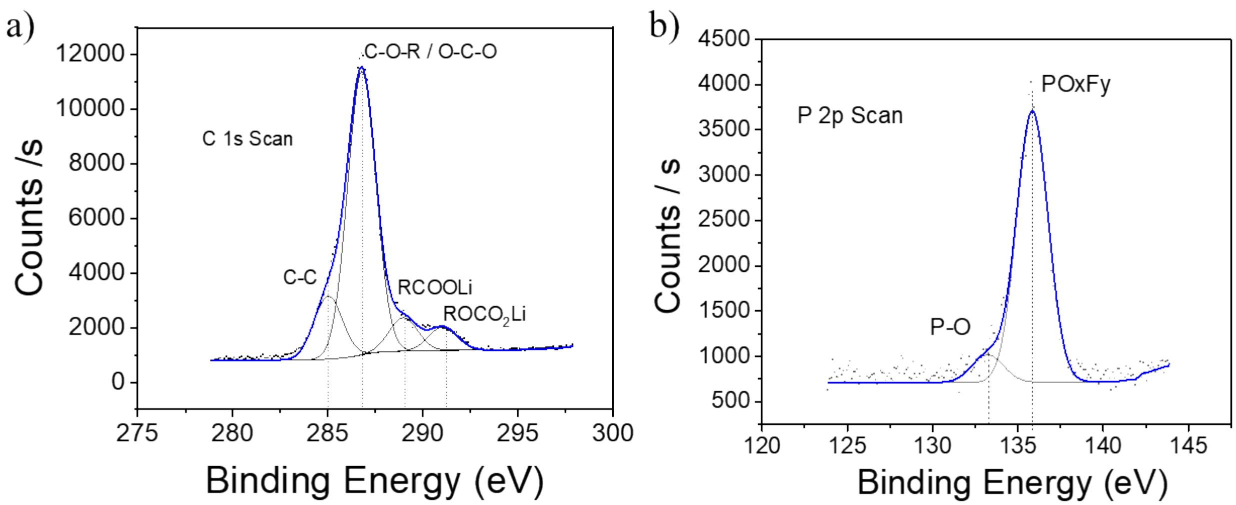

Figure S1. XPS spectra of DOL/TMP/$LiNO_3$/1M $LiPF_6$ coated **a)** C 1s spectrum, **b)** P 1s spectrum.

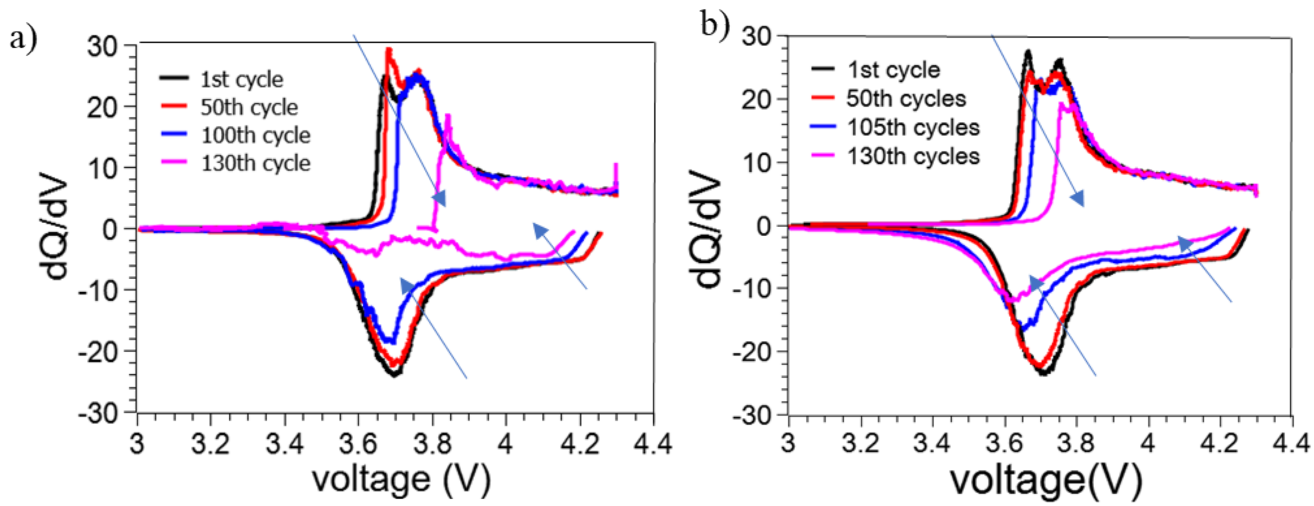

Figure S2. Differential capacity vs. voltage (dQ/dV) curves for **a)** bare lithium-NMC622 full cell **b)** DOL/TMP/$LiNO_3$ coated lithium

As the dQ/dV curve show, both cells with coated and uncoated Li have the same peaks and trend in peak shift. The shift in peak potential of dQ/dV curves indicate an increase in impedance over the cell's cycle life, while the broadening of each peak is due to chemical changes to the cathode materials. The coating layer seems to be electrochemically stable in full cell since no additional peak can be found in dQ/dV curve. Also, cell with coated Li still shows clear peaks after 130 cycles while without coating dQ/dV curves show very broad peaks.

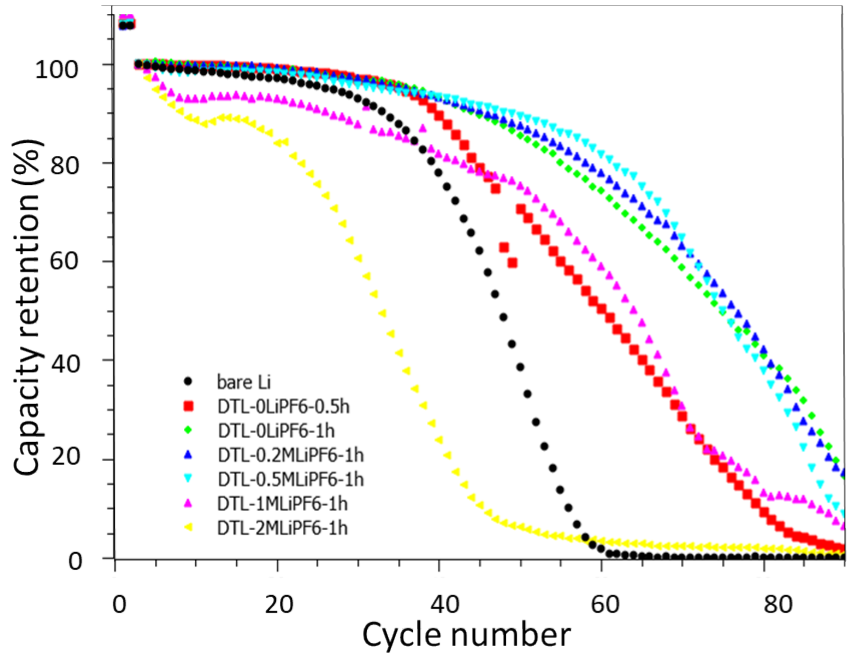

Figure S3. Average discharge capacity retention of full cells with coated lithium of various $LiPF_6$ concentration in coating solution at a rate of C/3.

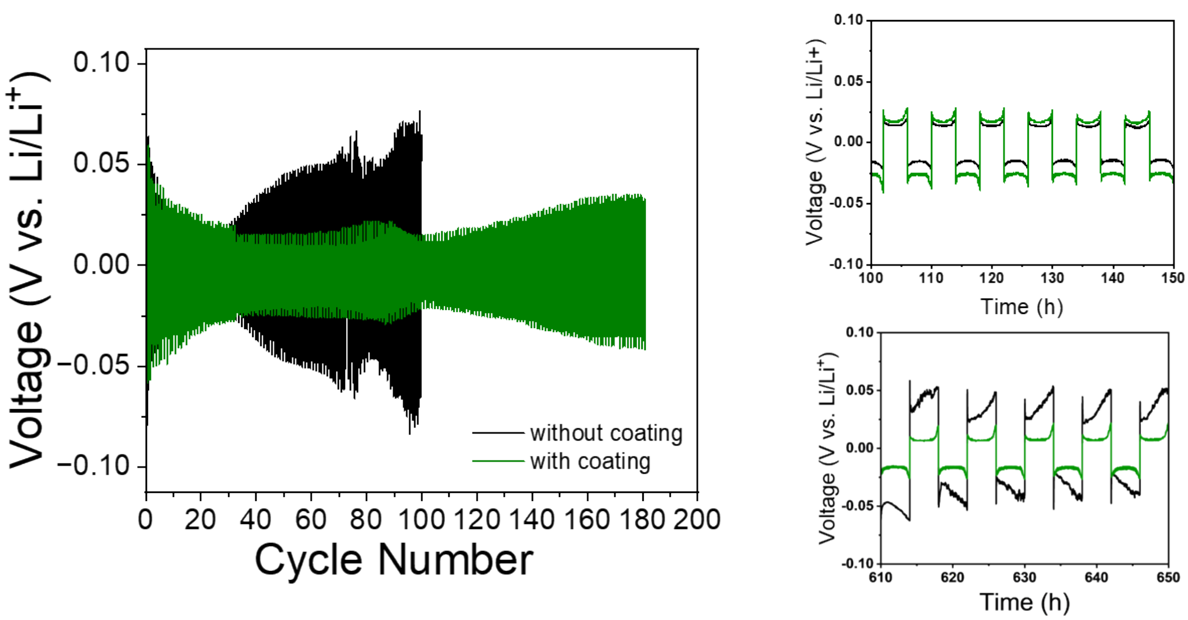

Figure S4. Li|Li stripping/plating voltage profiles for symmetrical cells with bare lithium (black) and poly-DOL/LiTFSI/LiFDOB coated lithium (green) at a current density of 0.25 mA cm^{-2} for 1 mAh cm^{-2}.

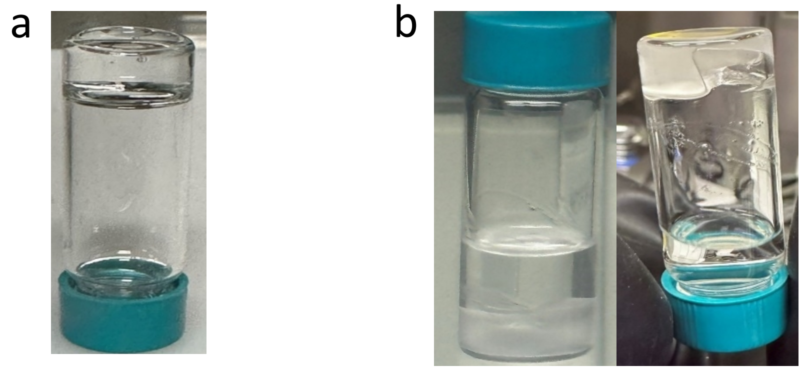

Figure S5. Digital photograph of a) poly-DOL/LiTFSI/LiDFOB gel b) poly-DOL/LiTFSI/LiDFOB gel with added DME after 5 days.