# Electronic Supplementary Information to Manuscript "Origin of Non-SEI Related Coulombic Efficiency Loss in Carbons Tested Against Na and Li"

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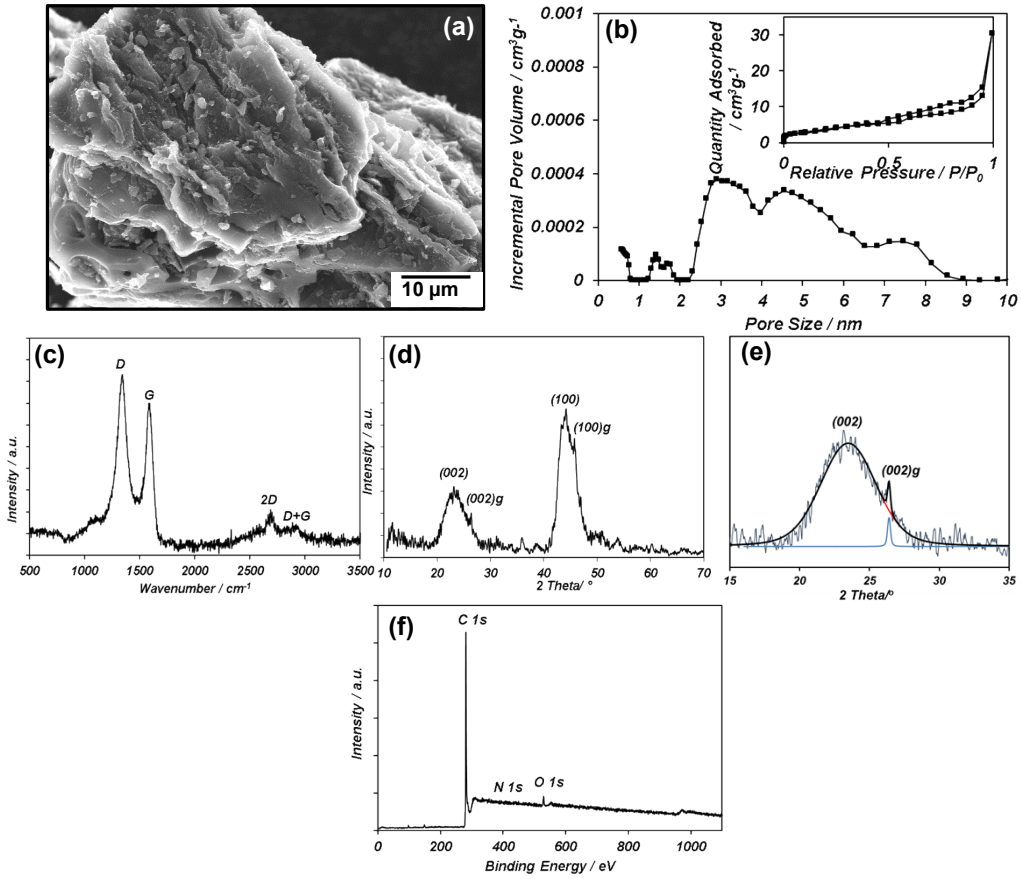


**Figure S1**: (a) SEM micrograph of the final carbon. The pore size distributions, calculated using density functional theory (DFT) model from the adsorption branch, with the inset showing nitrogen adsorption-desorption isotherms are shown in Figure S1(b), (c) Raman spectra, (d) XRD pattern, (e) fit between 15 and 35° and (f) X-ray photoelectron spectroscopy (XPS) result.

**Table S1.** Elemental composition information, XPS performed on as-synthesized powders

| | elemental analysis | | | | XPS | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Pyrolysis Temperature** | **C [wt%]** | **O [wt%]** | **N [wt%]** | **H [wt%]** | **C [wt%]** | **O [wt%]** | **N [wt%]** | **Si [wt%]** | **Cl [wt%]** |
| 1400 | 92.42 | 3.98 | 0.19 | 0.16 | 92.53 | 5.55 | 0.48 | 1.3 | 0.14 |

**Table S2.** XPS results on samples that were mechanically ground after synthesis so as to expose bulk material to surface analysis

| | XPS after grinding | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Pyrolysis Temperature** | **K [wt%]** | **Mg [wt%]** | **P [wt%]** | **C [wt%]** | **O [wt%]** | **N [wt%]** | **Si [wt%]** | **Cl [wt%]** |
| 1400 | 0.82 | 0.1 | 0.06 | 91.82 | 5.53 | 0.39 | 1.08 | 0.2 |

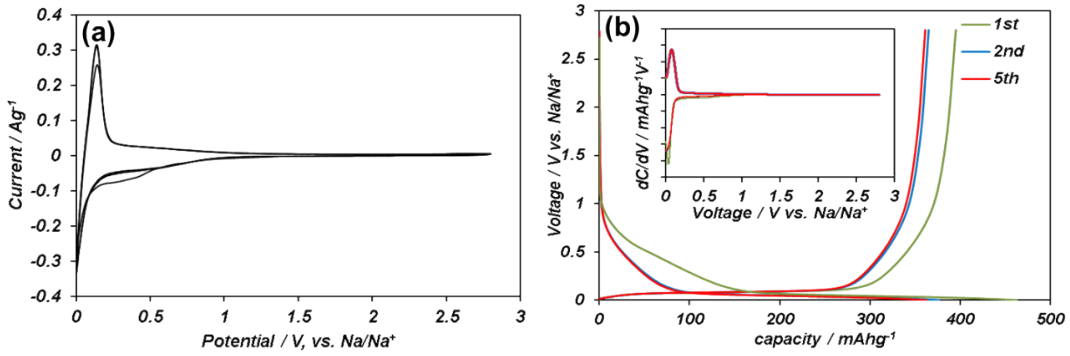


**Figure S2:** CV charge profiles of the electrode versus Na.and galvanostatic discharge/

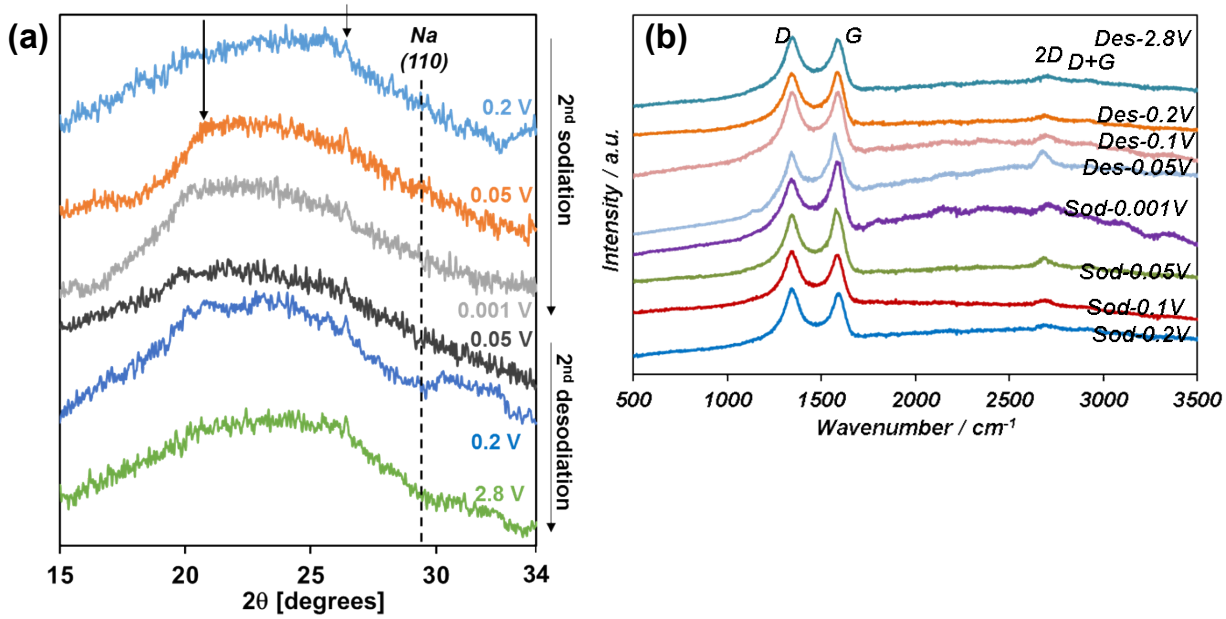


**Figure S3:** (a) XRD patterns at different discharge and charge voltages (vs. $Na/Na^+$) during the 2nd cycle. (b) Raman spectra at different discharge and charge voltages (vs. $Na/Na^+$) during the 2nd cycle.

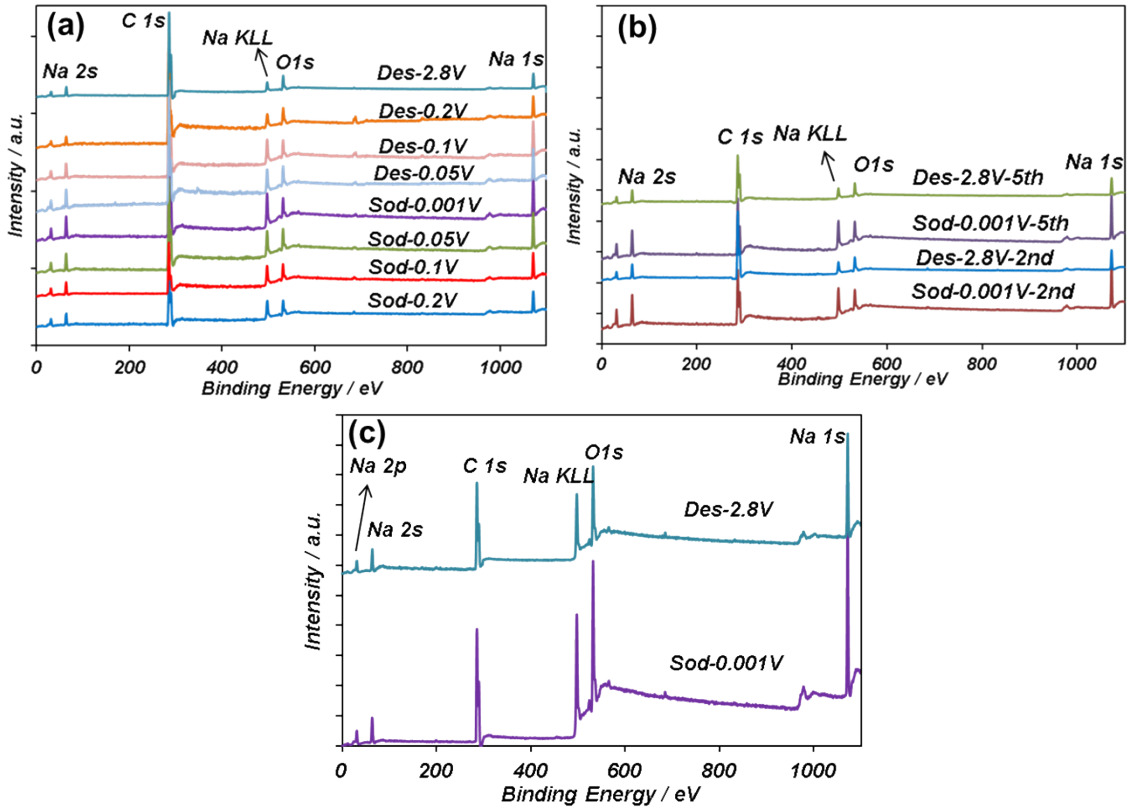


**Figure S4:** XPS survey spectra vs. potential (a) during the 1st, and (b) 2nd and 5th cycles after removal of SEI. (c) XPS survey spectra vs. potential during the 1st cycle without removal of SEI.

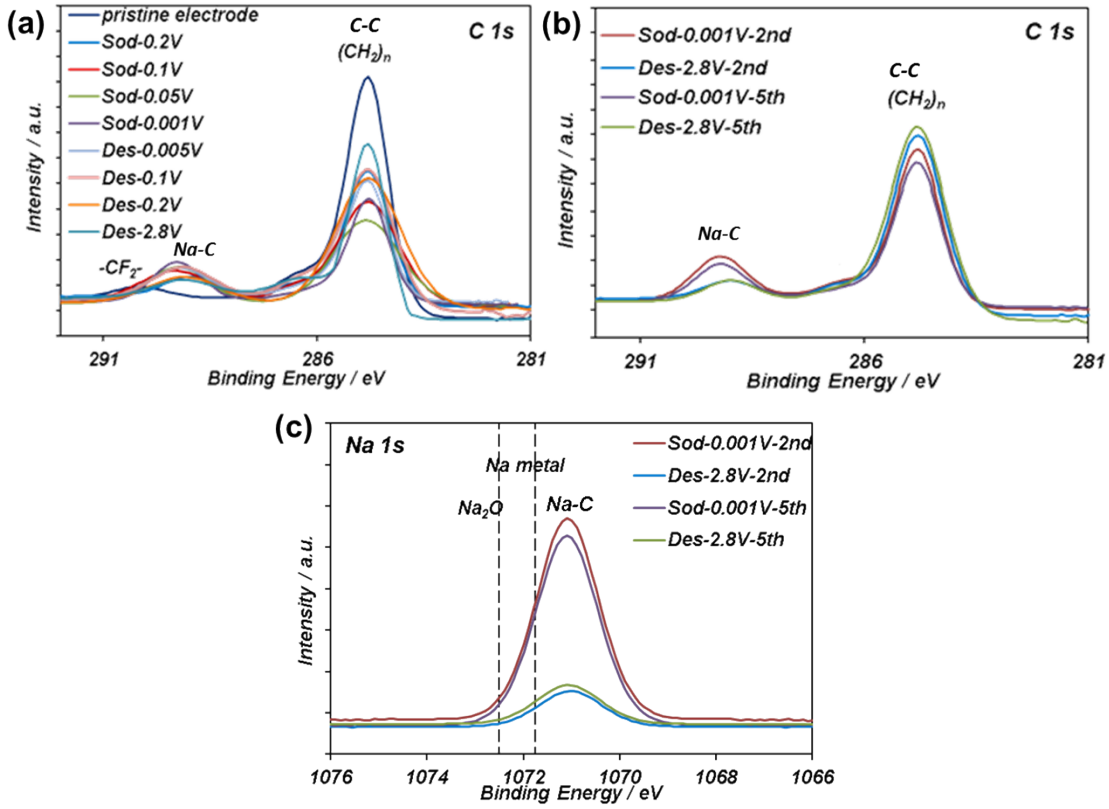


**Figure S5:** C 1s XPS spectra vs. potential ($Na/Na^+$) after removal of SEI of BPPG-1400, (a) during the 1st cycle, and (b) 2nd and 5th cycles. (c) Na 1s XPS spectra vs. potential during 2nd and 5th cycles.

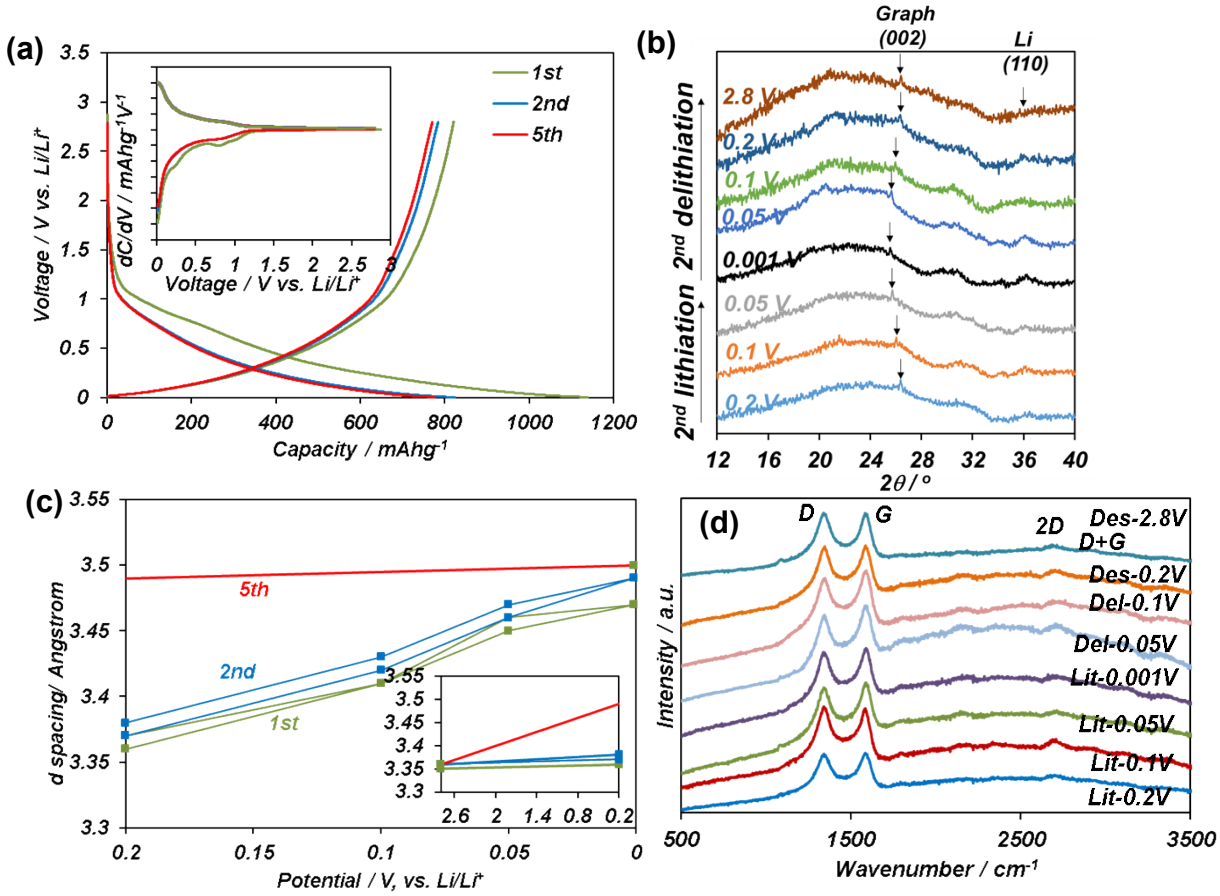


**Figure S6:** (a) Galvanostatic discharge/charge profiles of the electrode versus $Li/Li^+$. (b) XRD patterns at different discharge and charge voltages (vs. $Li/Li^+$) during the 2nd cycle. (c) Interlayer graphene spacing for the minority equlibrium graphite phase vs. potential for cycle 1, 2 and 5. (d) Raman spectra at different discharge and charge voltages vs. $Li/Li^+$ during the 2nd cycle

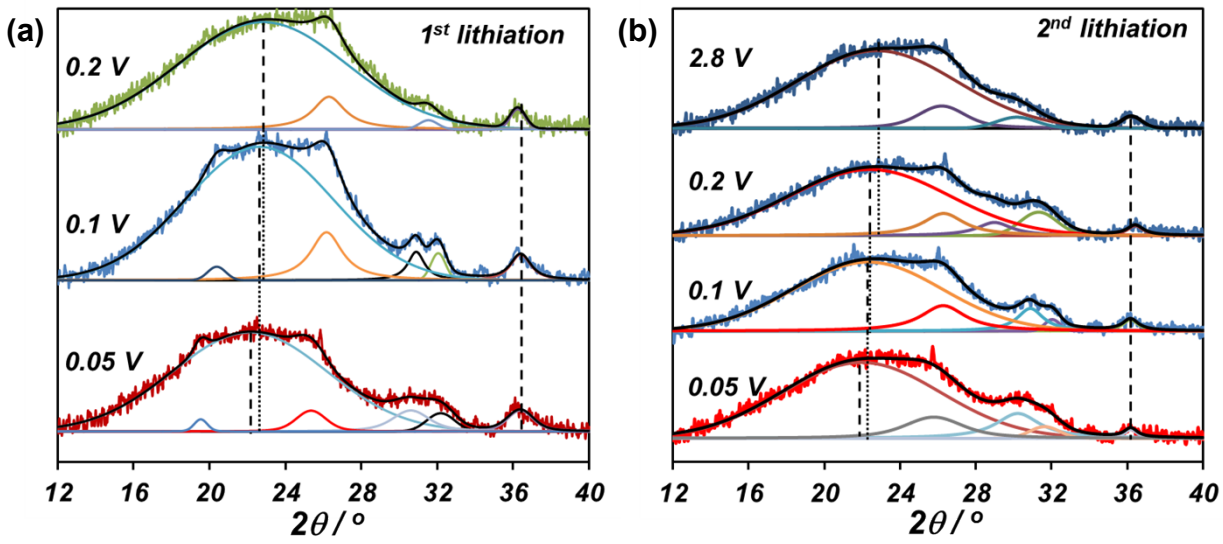


**Figure S7:** Deconvolution of XRD patterns during the first (a) and second (b) lithiation for potentials >0.001 V. The Li (110) reflection is visible around 36.2°

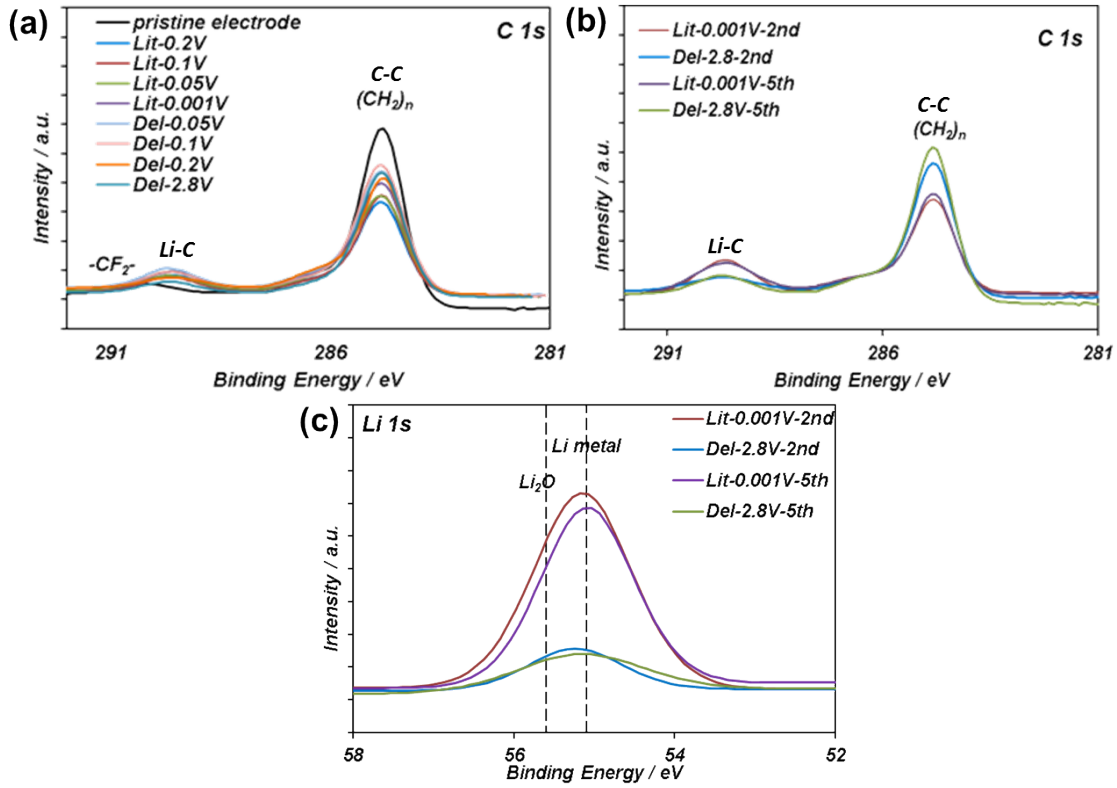


**Figure S8:** C 1s XPS spectra vs. potential (Li/Li$^+$) after removal of SEI of BPPG-1400, (a) during the 1$^{st}$ cycle, and (b) 2$^{nd}$ and 5$^{th}$ cycles (c) Li 1s XPS spectra vs. potential during 2$^{nd}$ and 5$^{th}$ cycles

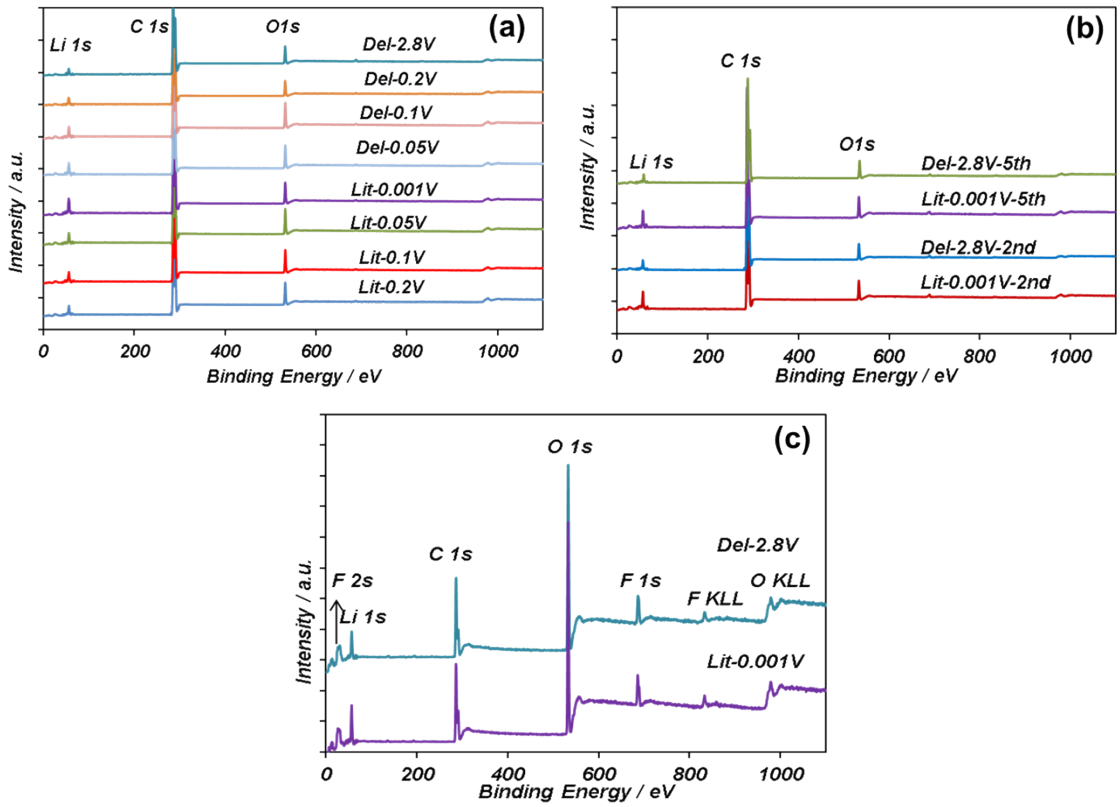


**Figure S9:** XPS survey spectra vs. potential (a) during the 1st, and (b) 2nd and 5th cycles after removal of SEI. (c) XPS survey spectra vs. potential during the 1st cycle without removal of SEI.