**Understanding and optimizing formation cycling on carbon black**

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**Figure S1.** Voltage vs. capacity and *dQ*/*dV* vs. voltage for the first two cycles of a carbon black/Li cell with a first lithiation rate 10C and a rate of C/10 for all other cycles. A small peak near 0.8 V on the second lithiation indicates that EC reduction did not complete on the first cycle. This experiment is the only one for which we observed an EC reduction peak beyond the first lithiation.