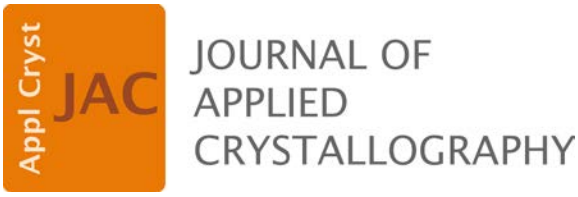

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Supporting information for article:

Intercalation of lithium into disordered graphite in a working battery

Rune E. Johnsen, Poul Norby and Matteo Leoni

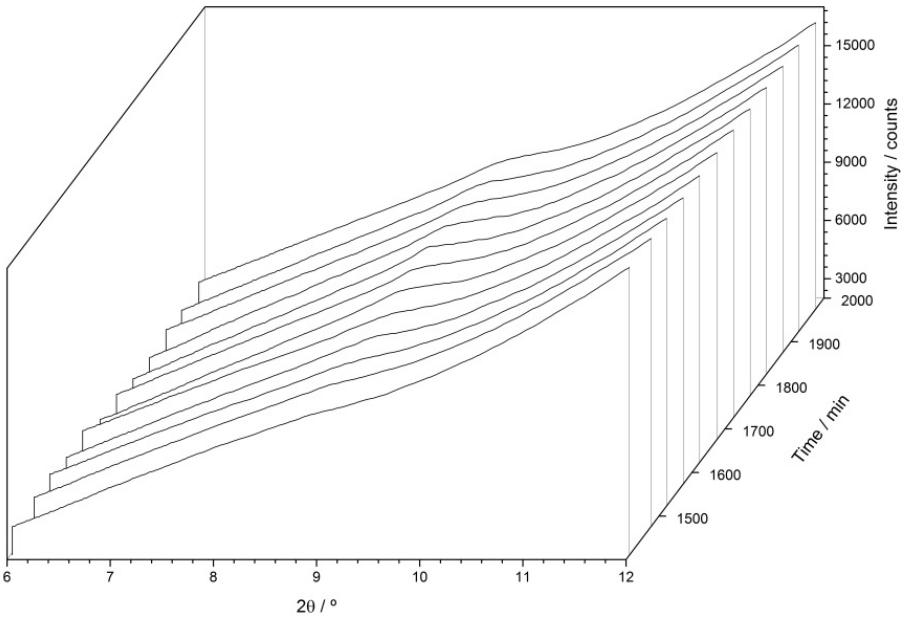

Figure S1 Low-angle part of the XRPD patterns of the graphitic electrode as a function of discharging time.

Fig. S1 shows the evolution of a diffraction peak at a position corresponding to the position of the 001 reflection of a LiC_{12} phase ($c \approx 7.0$ Å) as a function of time during the first galvanostatic discharging process.

Fig. S2 shows the initial changes in the cell potential and *d*-spacing values of the diffraction peak corresponding to the 002 diffraction peak of graphite 2H (and 003 diffraction peak of graphite 3R) as a function of discharging time using an ECC-Opto-Std battery cell from EL-CELL GmbH at our in-house Rigaku SmartLab equipped with a rotating Cu anode. The ECC-Opto-Std battery was discharged slowly with a current of 100 µA.

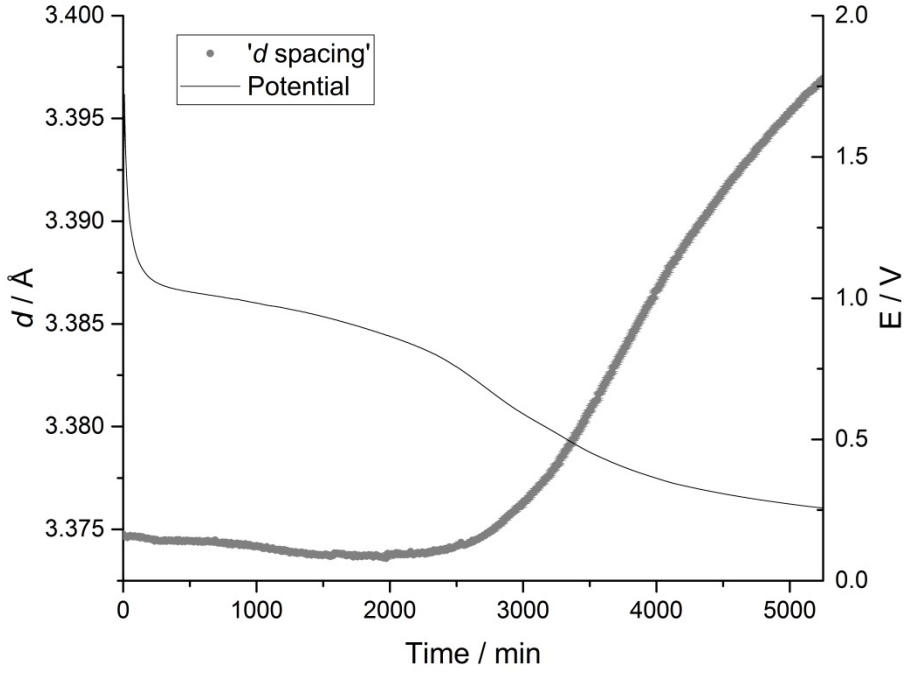

Figure S2 Changes in the cell potential and the '*d*-spacing' of the '002_{2H}' diffraction peak during a galvanostatic discharge.

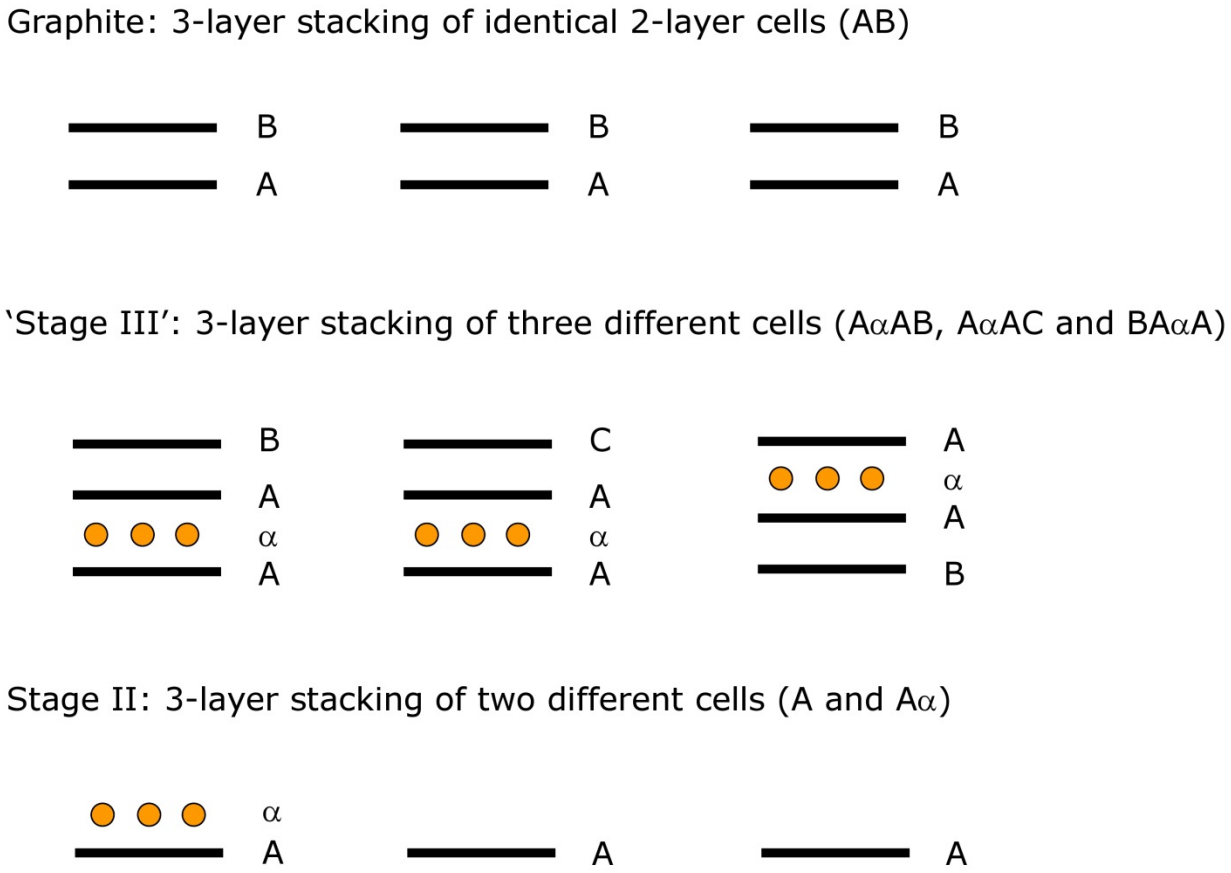

Figure S3 A sketch of the layers/cells for the different compounds.

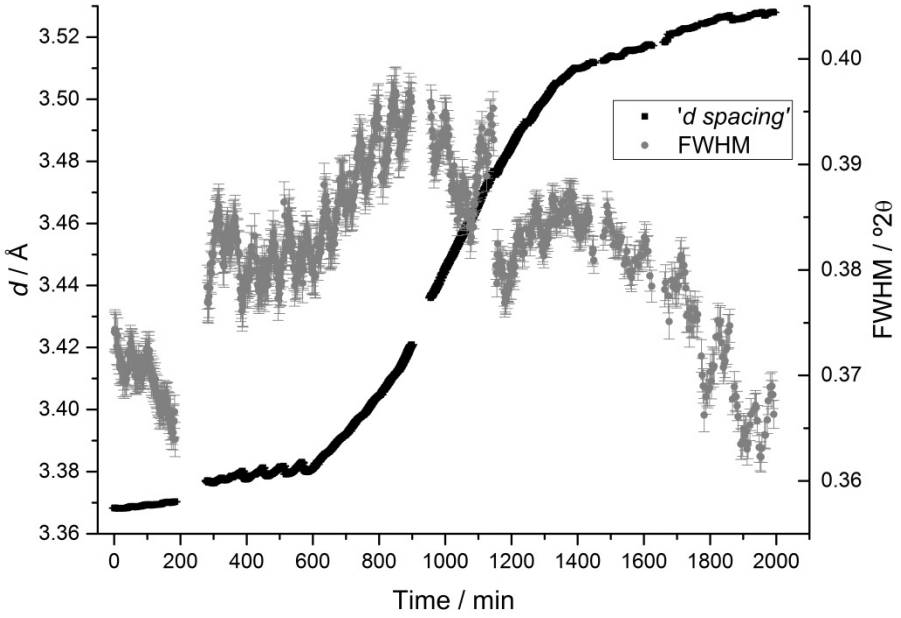

Figure S4 Changes in the '*d* spacing' and FWHM of the '002_{2H}' diffraction peak during a galvanostatic discharge. The ripples in the '*d* spacing' are due to instability in the power supply at MAX-lab.

Table S1 Layer translation vectors and stacking probabilities of the *DIFFaX+* refinement of a 'stage III' compound (t = 1205 min)

Layer transitions	*x*/*a*	*y*/*b*	*z*/*c*	Probabilities†
1-1	0	0	1	0
1-2	0	0	1	1
1-3	0	0	1	0
2-1	0	0	1	0.41(10)
2-2	2/3	1/3	1	0.33(15)
2-3	1/3	2/3	1	0.26(15)
3-1	0	0	1	0
3-2	1/3	2/3	1	0.81(4)
3-3	1/3	2/3	1	0.19(4)

† The standard deviations are estimated manually