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Thermal and structural stability of lithiated graphite battery anodes

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High-performance graphite is nowadays on of the most used anode materials in state-of-the-art Li-ion batteries. However, understanding the structural stability of lithiated graphites (Li_xC_6 with x<1) and its phase diagram remains limited and complex. In literature, the thermal-resolved phase stability of lithiated graphites is studied poorly and the results are often controversial [1, 2]. Thus, this study focuses on lithiated graphites at elevated temperatures, revealing structural changes, the loss of lithium, and the emergence of novel phases as LiF and Li_2O which are strongly linked to the degradation of the solid electrolyte interface (SEI), a critical factor in the performance of Li-ion batteries. The studies deepen the understanding of the behavior of lithiated graphite at high temperatures, which is particularly important with respect to fast charging applications and the degradation mechanisms of Li-ion batteries, which are crucial for modern energy storage systems.

[1] A. Senyshyn, M. J. Mühlbauer, O. Dolotko, and H. Ehrenberg, J. Power Sources 282, 235-240 (2015). (DOI 10.1016/j.jpowsour.2015.02.008.)
[2] V. Baran, O. Dolotko, M. J. Mühlbauer, A. Senyshyn, and H. Ehrenberg, J. Electrochem. Soc. 165, 1975-1982 (2018). (DOI 10.1149/2.1441809jes)

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