

In situ synchrotron X-ray studies of lithium intercalation in graphites during the pre-lithiation process

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Recently, Li-ion capacitors (LICs) have attracted remarkable interest because of their very high energy density. Li pre-doping processes are inevitable for LICs containing a pre-lithiated graphite electrode and activated-carbon. Moreover, an efficient pre-doping of the lithium-ion into graphite matrix in a short time can increase the productivity of the LICs. In this research, the rapid pre-lithiation of a graphite electrode was observed when a lithium metal and the graphite anode were in touch directly without a separator in the electrolyte. The pre-lithiation reaction of the half-cells was analyzed by in situ synchrotron X-ray studies, in transmission mode, of structural changes in graphite anode for Li-ion hybrid capacitors in the ambient condition. The pristine graphite peak was shifted and the pre-lithiation via direct contact method was much faster than other conventional pre-lithiation processes.