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Physical characterization of the charging process of a Li-ion battery and prediction of Li plating by electrochemical modeling

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Abstract

This paper deals with occurrence of lithium plating on the negative electrode of lithium-ion batteries, a significant ageing phenomenon known to damage lithium-ion battery performances. As a matter of fact, deposition of metal Li layer at the surface of the negative electrode induces mismatching between positive and negative electrodes and consequently capacity losses.

Charge transfer process, one of the two different steps of the process of Li insertion in the negative active material being the cause of this ageing, was considered here to be the limiting process. This transfer occurs at short-time scales. The second process, the diffusion of lithium in the solid insertion compound, occurring at relatively long-time scales, has not been fully examined here.

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