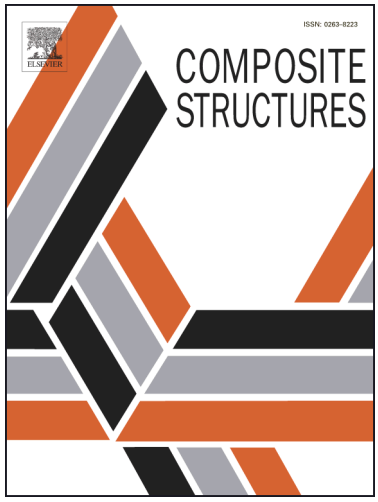

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Buckling analysis and control of layered electrode structure at finite deformation

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Highlights

A coupled mechanochemical model is proposed for buckling simulation.

The buckling behavior is strongly dependent on *SOC* & electrochemical process.

Lithiation-soften of active material remarkably reduces the buckling stability of cell system.

Design insights into enhancing the buckling resistance of electrode are provided.

Abstract:

This work has proposed a coupled mechanochemical model to investigate the buckling performance of electrode and thereby enhance the mechanical integrity of lithium-ion batteries. This method based upon finite deformation theory is capable to simulate the stage of charge (*SOC*) and path dependent buckling phenomenon of the layered structure. It is revealed that the buckling behavior of an electrochemical loaded electrode depends not only on the material properties and the electrode geometry but also on the charging/discharging process, *SOC* as well as the operation current rate.

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