Supplementary information

In order to investigate the stress changes of the Li anode of the test cell during galvanostatic charge/discharge cycles, the stresses of the fresh cells were real-time monitored under the same testing conditions with NMC cathode. Li metal is installed in the pristine cathode shell whose surface is smooth and the NMC electrode in the pristine anode shell whose surface is rough because the strain gauge cannot be well adhered to the rough surface for strain tests. From the testing results in Figure S1, the stress curves at the potential platform from 2.8 to 4.3 V have no obvious changes, close to the minimum detection limit of the strain gauge, indicating the stress change from lithium anode is low during cycles.

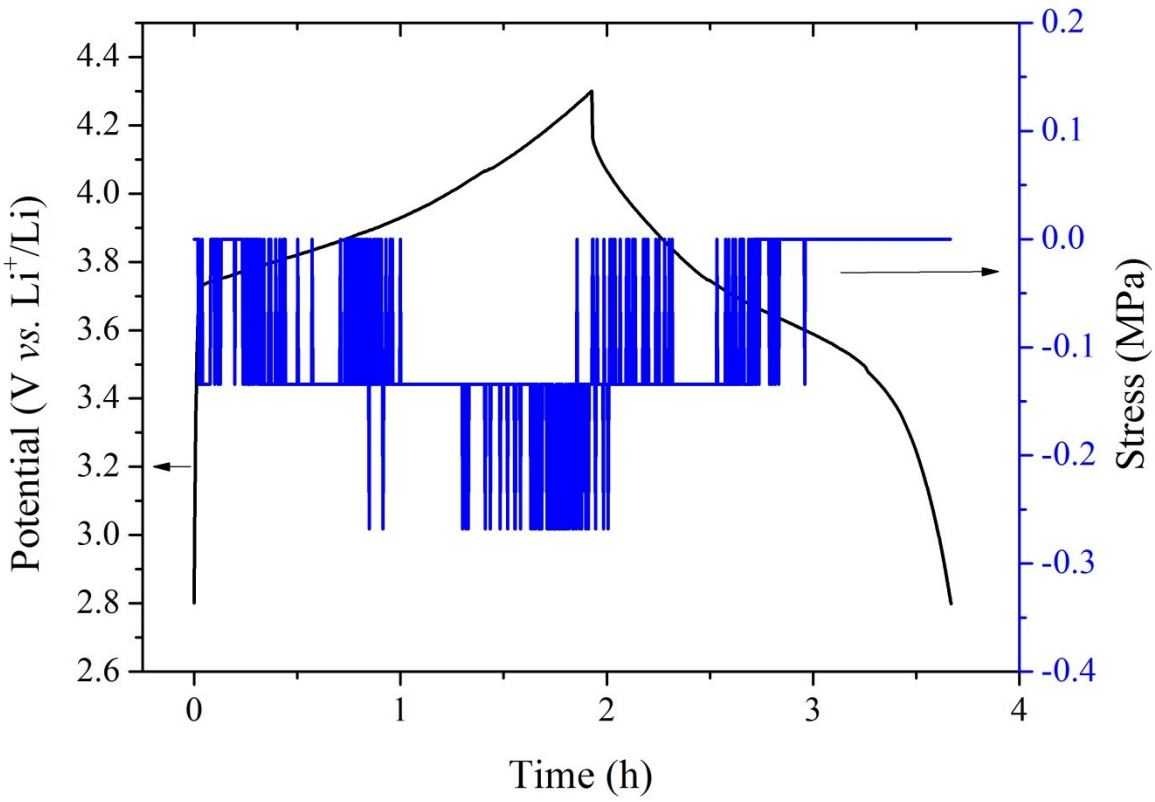

Figure S1. Galvanostatic charge/discharge curves and the corresponding strain-stress curves.

According to the structure of a full battery, strain gauges can be utilized to monitor its strain and stress changes. A commercial full battery for electric vehicles was chosen for the tests, and some pictures of the stress testing system are supplied in Figure S2. The process for adhering strain gauges is as follows: the plastic shell of the full battery was cleaned firstly by ethanol, and then dried and coated by glue. Two strain gauges were carefully pasted to the clean surface with glue, and one of them was for temperature compensation. The well-adhered strain gauges were connected to a 5210 stress-strain testing equipment.

Figure S2. Some pictures of the stress testing system for a commerical full battery.