

Automatic quenching cathode electrolyte interphase on Ni-rich cathode materials for preventing short circuit problem in lithium ion battery

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In January 2017, Samsung announced the reason why the Note 7 explodes and losses of more than 5 billion US dollar. According to their explanations, it was caused by the internal short circuit problem in the lithium ion battery. Currently, there is no effectively solution for eliminating the internal short circuit problem owing to the sudden accident.

In this research, a new technology has been developed, which can be used to terminate the thermal runaway and promise the safety performance of lithium ion battery. High voltage Li-excess and Ni-rich layer-type cathode materials (811 & 622) are employed and combined with this safety electrode additive for investigation. In terms of the results, the new technology LIVING[®] additive significantly enhances the cycle performance at 60°C and high voltage. In addition, the following figures illustrated that the battery containing LIVING[®] technology is stable and passed the nail penetration test. On the other hand, the battery without LIVING[®] cannot be used when the short problem is taking place. The LIVING[®] contains self-polymerized hyper branch structure in order to insulate the directly contact between anode and cathode. This electrode additive not only provides high thermal stability on electrochemical reaction, but the coulombic efficiency of charge-discharge is also enhanced.

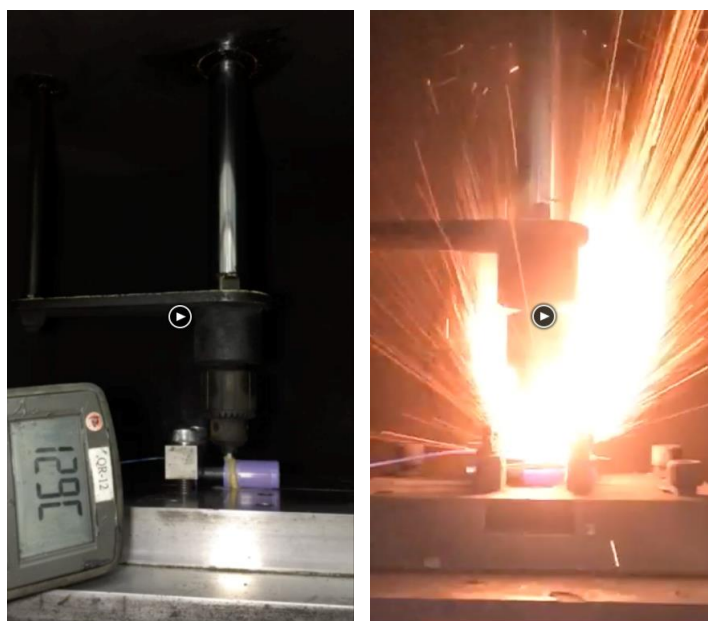


Figure 1 (left) The battery containing LIVING[®] technology and (right) the battery without any modification.

References

[1] Fu-Ming Wang, J. Membrane Sci. 368 (2014) 165.