

Novel fluorinated phosphate electrolyte additive

for safe lithium ion battery

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Lithium ion batteries have been widely used as power source of consumer electronics, driving (plug-in) hybrid electric transportation and power-grid systems. However, as a solution to high energy density storage, lithium-ion batteries have been seriously plagued by the safety issues. We introduced the fluorinated phosphate as the flame-retardant additive in electrolytes, and the electrochemical performance was contained with negligible degradation. As the derived SEI was effected by the addition of fluorinated phosphate, the thermal stability of batteries with or without the additive were compared. We could conclude that the onset temperature of self-heating and thermal runaway was decreased by using the flame-retardant. The heat calorific was lower and the time of thermal runaway was extended as the additive has a short self-extinguishing time and formed more stable SEI layer at the electrode.

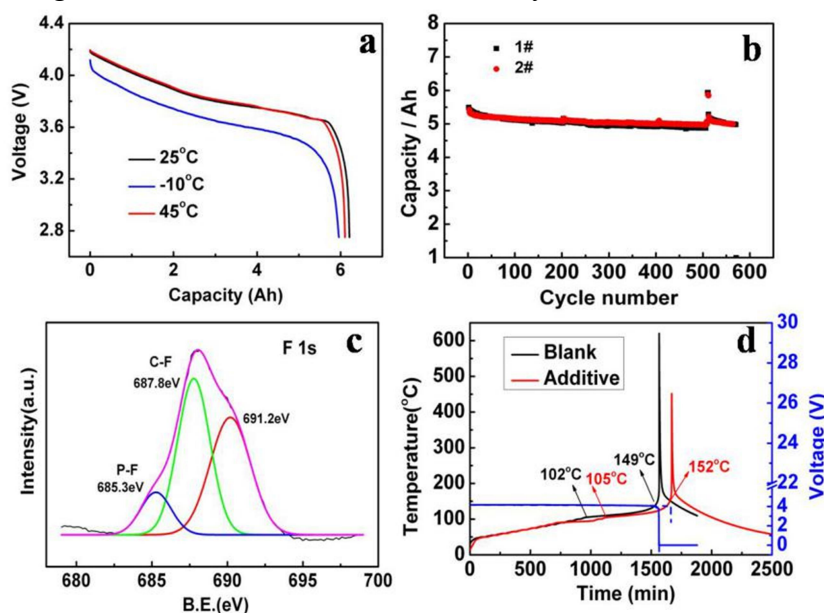


Figure 1. The electrochemical and thermal performance of the fluorinated phosphate additive: (a) discharge curves at different temperature; (b) cycle performance; (c) XPS of F 1s from anode; (d) thermal runaway process.

Reference:

1. K. Xu, S.S.Zhang, *et al.* J. Electrochem. Soc., 2002,149 :A1079-A1082 .
2. P. Ping, Q.S.Wang, *et al.*J. Electrochem. Soc., 2012,159:A1467-A1473.