

Heat exposure test of Li ion battery with additives

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Heat exposure is one of the critical safety test of Li-ion battery. Some of the customers request that the battery overcharged to 4.35V should not be smoked at 150°C 1h. In this study SDI's prismatic Li-ion cell (740mAh) Generally the battery overcharged to 4.35V at room temperature and 60°C pass the heat exposure test of 150°C: no smoke. In case that the cells which contain some kinds of additive were overcharged to 4.35V at -5°C, they do not pass the heat exposure test of 150°C. Additive A is used in order to decrease the thickness of charged cell. Table. 1 shows that the cell contain additive A. In case of overcharge at -5°C The cell with 0.65% of additive A is smoked at heat exposure test at 140°C, 150°C respectively. Table. 2 shows heat test results of cells with various concentrations of additive A the temperature range from 130°C to 150°C. Fig.2 shows voltage profile for cells with a same composition as in table 2. The higher the concentration of additive A is, the more deposition on anode surface, the more additive added, the higher overpotential that is caused lithium containing film deposition on anode surface. This film reacts vigorously at high temperature exposure. Finally cell is smoked. In the case of additive B, and C in order to improve overcharge test, the cells overcharged to 4.35V at -5°C are also smoked at 150°C 1hr. Briefly these additives to improve cycle life could deteriorate heat exposure property. Detailed results of various additives and thermal studies will be presented and discussed in detail.

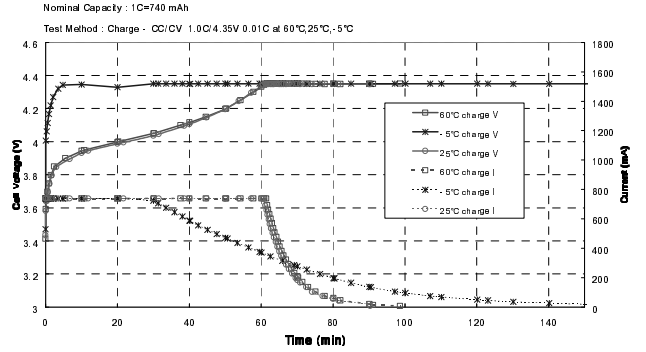


Fig. 1 Charge Characteristics at different Temp.(additive A 0.65%)

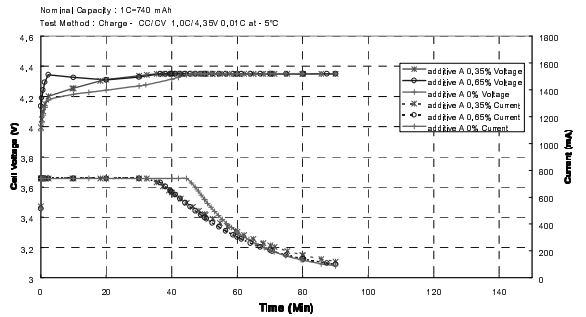


Fig. 2 Charge Characteristics according to the content of additive A at -5°C

Table 1. The result of heat exposure test at various temperatures (overcharged to 4.35V, additive A 0.65%)

	-5°C Overcharge	25°C Overcharge	60°C Overcharge
130°C 1h	No change	No change	No change
140°C 1h	Smoke	No change	No change
150°C 1h	Smoke	Leak	Leak

Table 2. The result of heat exposure test according to the content of additive A (overcharged to 4.35V at -5°C)

	A 0%	A 0.35%	A 0.65%
130°C 1h	No change	No change	No change
140°C 1h	No change	No change	Smoke
150°C 1h	Leak	Leak	Smoke