

Thermal failure and combustion behavior study on LiFePO₄/graphite energy storage batteries

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In recent years, with the development of lithium-ion batteries, the application technology of LiFePO₄/C battery has achieved considerable progress. Its safety behavior, however, is still the largest technical bottle-neck that hinders its development. In order to study the combustion mechanism of the LiFePO₄/C batteries after thermal failure, thermodynamic parameters were measured in the process of the combustion.

The commercialized LiFePO₄/C lithium ion batteries were used in the measurement. Firstly, the batteries were set to 0%, 50%, 100% state of charge (SOC), and the combustion behaviors were investigated through cone calorimeter measurements such as total heat release (as shown in Fig.1), heat release rate, smoke produce rate, mass loss rate, fire performance index, and so on. Secondly, the different micro-structures of the electrode surfaces have also been observed in the different SOC in order to explore the combustion mechanism of the power LiFePO₄/C battery and evaluate its safety performance (in Fig.2). With the increase of SOC, surface of the negative electrode plates become more and more rougher.

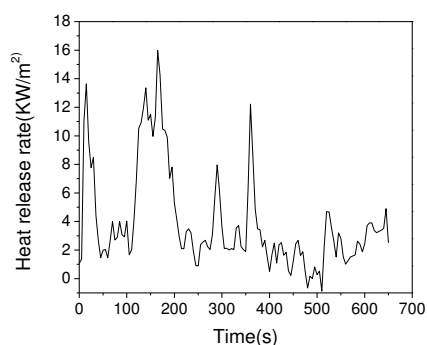


Fig.1 Heat release rate of cathode plates (SOC=100%)

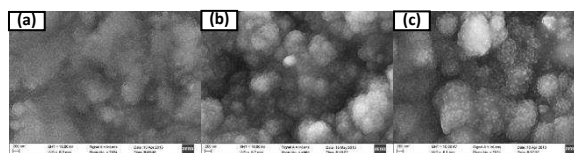


Fig.2 SEM images of negative plates, (a)SOC=0%(b)SOC=50%(c)SOC=100%

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