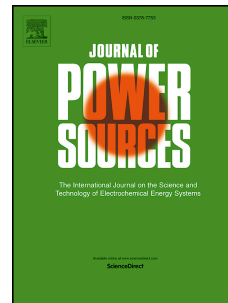


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Investigation on Internal Short Circuits of Lithium Polymer Batteries with a Ceramic-Coated Separator during Nail Penetration

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Internal short circuit of a lithium polymer battery (4.6 Ah capacity and 4.30 V charging voltage) with a ceramic-coated separator has been investigated by infrared measurement during nail penetration. The surface temperatures at nail penetration area and battery body were simultaneously measured by infrared camera and, as a result, three different failure modes have been proposed. The battery with 100% of SOC experiences thermal runaway phenomenon by means of the second internal short circuit. The batteries with low SOC (0% and 50% of SOC) were also investigated to identify the phenomena occurred in SOC 100% battery (the second internal short circuit), but neither fire nor explosion in the battery with low SOC was observed. The analysis of burr status after nail penetration demonstrates that it is quite important factor related to the failure modes. The results of this study can be applied to the design of safe battery.

Keywords: Nail penetration, Internal short circuit, Infrared measurement, Slim and wide battery, Ceramic coated separator, Lithium polymer battery

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