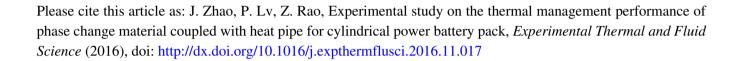
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ACCEPTED MANUSCRIPT

Experimental study on the thermal management performance of phase change material

coupled with heat pipe for cylindrical power battery pack

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Abstract

The battery thermal management technology is vital for the development of new energy vehicles.

In order to understand the performance of the phase change material/heat pipes (PCM/HP) coupled

thermal management system for cylindrical power battery, an PCM/HP coupled BTM module was

designed and tested experimentally in detail. The results showed that the effect of temperature

control based on PCM is improved comparing to air-based BTM under natural convection. The

maximum temperature of PCM/HP coupled BTM can be controlled below 50°C for longer time than

those of the air-based case and PCM-based case under the same conditions. The temperature

difference can be reduced about 33.6% through filling PCM and it can progress a decline of 28.9%

further through embedding HP into the PCM. The maximum temperature difference of PCM/HP

coupled BTM can be controlled below 5°C for longer time than those of the two other cases,

air-based BTM and PCM-based BTM. It is almost the same in the first 620s under different

velocities, which are all less than 5°C.

Keywords: Battery thermal management, Phase change material, Heat pipe, Maximum temperature,

Temperature difference

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