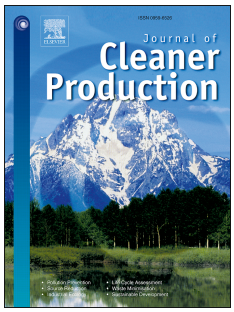
Accepted Manuscript



Experimental investigation on thermal management performance of electric vehicle power battery using composite phase change material

Xuan Zhang, Chenzhen Liu, Zhonghao Rao

PII: S0959-6526(18)32412-0

DOI: 10.1016/j.jclepro.2018.08.076

Reference: JCLP 13860

To appear in: *Journal of Cleaner Production*

Received Date: 5 December 2017

Revised Date: 30 July 2018

Accepted Date: 8 August 2018

Please cite this article as: Zhang X, Liu C, Rao Z, Experimental investigation on thermal management performance of electric vehicle power battery using composite phase change material, *Journal of Cleaner Production* (2018), doi: 10.1016/j.jclepro.2018.08.076.

Experimental Investigation on Thermal Management Performance of Electric Vehicle Power Battery Using Composite Phase Change Material[1]

Xuan Zhang, Chenzhen Liu, Zhonghao Rao**

School of Electrical and Power Engineering, China University of Mining and Technology, Xuzhou 221116 China

Corresponding author. Tel.: +86 051683592000. E-mail address: raozhonghao@cumt.edu.cn.

Abstract: The development of electric vehicles (EVs) is beneficial to a cleaner environment. As the powertrain of EVs, power battery is limited obviously by its fast operating temperature rise and large temperature variation among different parts, so an efficient battery thermal management (BTM) system is desirable. In this paper, a battery thermal management system using kaolin/expanded graphite (EG)/paraffin composite was designed. By contrasting different thermal properties of ternary composites with various proportions, the most suitable composite with 10wt.% EG and 10wt.% kaolin was selected for the thermal management testing, which has a conductivity of larger than 6 W/(m • K) and did not shows any visible leakage after 30 min at 60°C. In the thermal management test, the temperature of a single battery was effectively controlled under 45°C even at the discharge rate of 4C, and the temperature difference of the single battery was restrained within 5°C. Besides, the composite had reduced the temperature of the battery pack by 25.77% at 4C rate, and the temperature difference of the battery pack or each battery in the pack could be greatly controlled once the phase change occurred. In conclusion, the excellent temperature controlling performance of the new phase change material (PCM) was

---

The short version of the paper was presented at ICEEE2017/ISEV2017 on July 26-29, Sweden. This paper is a substantial extension of the short version of the conference paper.