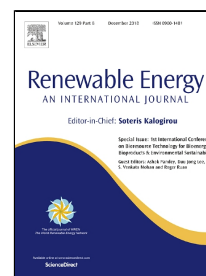


Accepted Manuscript

Experimental investigation on thermal properties and thermal performance enhancement of octadecanol/expanded perlite form stable phase change materials for efficient thermal energy storage



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PII: S0960-1481(18)30899-1
DOI: 10.1016/j.renene.2018.07.102
Reference: RENE 10376
To appear in: *Renewable Energy*
Received Date: 07 February 2018
Accepted Date: 20 July 2018

Please cite this article as: Peizhao Lv, Mingyue Ding, Chenzhen Liu, Zhonghao Rao, Experimental investigation on thermal properties and thermal performance enhancement of octadecanol /expanded perlite form stable phase change materials for efficient thermal energy storage, *Renewable Energy* (2018), doi: 10.1016/j.renene.2018.07.102

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1 **Experimental investigation on thermal properties and thermal performance enhancement of**2 **octadecanol/expanded perlite form stable phase change materials for efficient thermal energy storage**

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7 **Abstract:**

8 Octadecanol (OC) was employed as phase change material (PCM) to compound with expanded perlite (EP)
9 because of its relatively high latent heat capacity (245.97 kJ/kg). OC/EP composites were prepared via vacuum
10 impregnation method in this paper. The microstructure, chemical components and interactions that between two
11 materials were characterized via Scanning Electron Microscope (SEM), X-Ray Diffraction (XRD) and Fourier
12 Transform Infrared Spectroscopy (FTIR). The leakage-proof properties of OC within the composites were
13 investigated and the leakage phenomena were weakened by adding expanded graphite (EG) with mass fractions
14 of 5%, 10% and 15%. The mass fraction of OC maintains 60% without any leakage after adding EG (mass
15 fraction of 15%). Latent heat capacity and phase change temperature were tested via Differential Scanning
16 Calorimeter (DSC). Latent heat capacity of 60% OC/EP/15EG is 140.20 kJ/kg, and phase change temperature is
17 59.00 °C. The thermal conductivity of the composites was tested, and the variation tendency was linearly fitted.
18 The thermal storage and release tests were performed to evaluate thermal performance of the composites. And
19 the efficiency of the heat storage and release of OC/EP composites were improved significantly after filling EG
20 (mass fraction of 15%) into the interspace that is among the particles of EP.

21 **Keywords:** Phase change material; Thermal energy storage; Expanded perlite; Expanded graphite; Heat
22 transfer enhancement

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