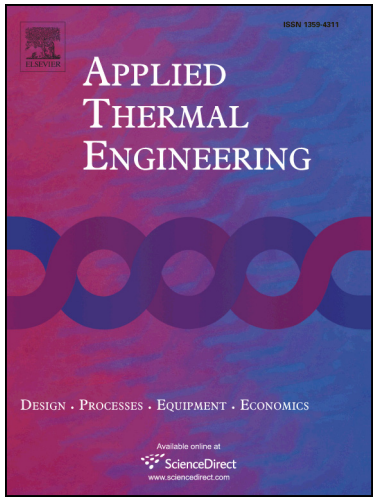

Experimental study of the thermal characteristics of microencapsulated phase change composite cylinders

Y. Fang, Z.G. Qu, Y.D. Fu

PII: S1359-4311(16)33331-2
DOI: http://dx.doi.org/10.1016/j.applthermaleng.2016.11.111
Reference: ATE 9522

To appear in: *Applied Thermal Engineering*

Received Date: 29 March 2016
Revised Date: 7 November 2016
Accepted Date: 15 November 2016

Please cite this article as: Y. Fang, Z.G. Qu, Y.D. Fu, Experimental study of the thermal characteristics of microencapsulated phase change composite cylinders, *Applied Thermal Engineering* (2016), doi: http://dx.doi.org/10.1016/j.applthermaleng.2016.11.111

Experimental study of the thermal characteristics of microencapsulated phase change composite cylinders

Y. Fang, Z.G. Qu*, Y.D. Fu

MOE Key Laboratory of Thermo-Fluid Science and Engineering, School of Energy and Power Engineering, Xi'an Jiaotong University, Xi'an, Shaanxi 710049, China

* Corresponding Author. Tel/Fax: +86-029-82668543; E-mail: zgqu@mail.xjtu.edu.cn.

Abstract:

The melting thermal performance of hollow cylinder microencapsulated phase change material (MEPCM) composite samples is investigated for thermal energy storage applications. Temperatures at different radial positions and the growth of liquid–solid interfaces in the samples are analyzed under the influence of the MEPCM particle fraction, the PCM core fraction in the particles, and the mass fraction of additives with high thermal conductivity. The liquid–solid interface increases at constant speeds for different samples. The higher the fraction of MEPCM particles in a sample, the more time the phase change process consumes, thereby revealing that more energy is converted to latent heat for PCM. There is a mild difference in the duration of the phase change process in samples with different PCM core fractions. At a similar phase change duration, the average temperature is lower in the samples with a higher core fraction. The effect of the additives is related to micromorphology. When additives are added to the samples, the temperature distribution is more uniform, and the duration of the phase change process is shorter due to the enhanced thermal diffusivity.

Keywords: MEPCM, Melting, Liquid–solid interface, Thermal energy storage

Nomenclature

α	mass fraction of the MEPCM particles in MEPCM composite samples
β	mass fraction of the PCM core in a single MEPCM particle
γ	mass fraction of the conductivity additive in MEPCM composite samples