

Accepted Manuscript

Fatty acids based eutectic phase change system for thermal energy storage applications

Hassan Nazir, Mariah Batool, Majid Ali, Arunachala M. Kannan

PII: S1359-4311(18)31446-7
DOI: <https://doi.org/10.1016/j.applthermaleng.2018.07.025>
Reference: ATE 12383

To appear in: *Applied Thermal Engineering*

Received Date: 7 March 2018
Revised Date: 18 June 2018
Accepted Date: 5 July 2018

Please cite this article as: H. Nazir, M. Batool, M. Ali, A.M. Kannan, Fatty acids based eutectic phase change system for thermal energy storage applications, *Applied Thermal Engineering* (2018), doi: <https://doi.org/10.1016/j.applthermaleng.2018.07.025>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Fatty acids based eutectic phase change system for thermal energy storage applications**Hassan Nazir^{a,b}, Mariah Batool^{a,b}, Majid Ali^b, Arunachala M. Kannan^{a*}**^aThe Polytechnic School, Ira. A. Fulton Schools of Engineering, Arizona State University, Mesa, AZ
85212 USA^bUS-Pakistan Center for Advanced Studies in Energy (USPCAS-E), National University of Sciences
and Technology, Islamabad 44000, Pakistan**Abstract**

Multiple fatty acid based eutectic phase change materials are prepared for low to moderate temperature latent heat thermal energy storage applications. In particular, palmitic acid, myristic acid, stearic acid, lauric acid and commercial PureTemp68 are used for making eutectic mixtures. The eutectic point of each eutectic mixture is determined using Schrader equation along with its thermophysical properties. Ten different eutectic mixtures are prepared in accordance with eutectic point obtained from the phase diagrams by melt blending followed by ultra-sonication. The latent heat, melting point as well as the specific heat capacity of the eutectic phase change material are determined by Differential Scanning Calorimetry (DSC). The results revealed that the melting point of these organic phase change materials ranges from ~27-75 °C, with the latent heat from ~127 to 210 kJ·kg⁻¹ respectively. Chemical structure of these phase change materials is determined by using Fourier Transformation Infrared Spectroscopy (FT-IR) and the presence of carboxylic group in obtained spectra is in accordance with the fatty acids. It is evident that these eutectic phase change materials possess promising characteristics for thermal energy storage ranging from the room temperature to ~75 °C.

Keywords: Thermal energy storage; eutectic phase change materials; fatty acids; PureTemp68; Thermophysical properties.

*Corresponding author: E-mail: amk@asu.edu; Phone: +1-480-7271102

Download English Version:

<https://daneshyari.com/en/article/7044826>

Download Persian Version:

<https://daneshyari.com/article/7044826>

[Daneshyari.com](https://daneshyari.com)