N-tetradecane energy storage density

Does N -tetradecane emulsifier influence the performance of a microencapsulated phase change material?
A novel silica (SiO 2)/ n -tetradecane microencapsulated phase change material (MEPCM) was synthesized by in situ interfacial polycondensation. The influences of the amount of the composite emulsifier and the mass ratio of n -tetradecane and tetraethyl silicate on the MEPCM performance were systematically investigated.

Does graphite tetradecane have a latent heat?
First,consider water and graphite-tetradecane. The latter has a power density figure of merit that is three times higher than that of water,but a latent heat that is half that of water. But it is unclear how to weigh the relative importance of the power figure of merit and the latent heat.

Why is N -tetradecane encapsulated fast?
The excessively high reaction ratecaused the n -tetradecane droplets to be quickly encapsulated,where the encapsulation rate still reaches 80.9%. However,when the acidity of the experimental system is relatively high (PH = 4.0),the reaction speed is slow.

Why is the mass ratio of N -tetradecane microcapsules important?
Since the density of n -tetradecane phase change microcapsules is less than water,but greater than absolute ethanol,the mass ratio of water to absolute ethanol in the base fluid is very important to the physical stability of the LHFF.

What is the phase change enthalpy of N -tetradecane microcapsules?
In this work,the optimal preparation conditions of n -tetradecane microcapsules are studied,and the encapsulation rate is increased to 85.6%. The phase change enthalpy of n -tetradecane microcapsules is about 178.1 J·g -1. Fig. 9. Overall picture and wall thickness of microcapsules. Fig. 10.

Can N-tetradecane core material be encapsulated by silica shell material?
The results showed that the n -tetradecane core material was successfully encapsulated by silica shell material with encapsulation ratio of 62.04%. The MEPCM had a melting enthalpy of 140.5 kJkg -1 and thermal conductivity of 0.139 Wm -1 K -1.

Download Citation | Synthesis and thermal properties of n-tetradecane phase change microcapsules for cold storage | Due to the high heat carrier density, latent heat functional fluid may be used ...

The use of paraffin as a phase change material has many advantages, e.g., low cost, high energy storage density (amount of energy stored per mass unit), chemical stability, small changes in volume ...

The objective of this paper is to study the thermal performance of latent cool thermal energy storage system using packed bed containing spherical capsules filled with phase change material during charging and

discharging process. According to the energy balance of the phase change material (PCM) and heat transfer fluid (HTF), a mathematical model of packed ...

The n-tetradecane microcapsules LHFF contains phase change materials so its transport energy capacity per unit mass is higher than that of frozen water in ice storage ...

Nanoencapsulated n-tetradecane phase change materials with melamine-urea-formaldehyde-TiO 2 hybrid shell for cold energy storage. Author links open overlay panel Jinghang Wang, Xinyu Zhai, Zunrui Zhong, Xinwen Zhang, ... Owing to the significantly higher density of TiO 2 nanoparticles than that of n-tetradecane and MUF resin, ...

Thermal performance simulations of a packed bed cool thermal energy storage system using n-tetradecane as phase change material. ... Phase transition temperature ranges and storage density of paraffin wax phase change materials. Energy, 29 (2004), pp. 1785-1804.

Energy Storage Science and Technology >> 2019, Vol. 8 >> Issue (5): 874-879. doi: 10.12028/j.issn.2095-4239.2019.0045. Previous Articles Next Articles Molecular dynamics simulation of phase transformation process of n-tetradecane . ZHANG Xuelai 1, WANG Xuzhe 1, WANG Jifen 2, XU Xiaofeng 1, HUA Weisan 1, FANG Manting 1

As carriers of latent thermal energy, PCMs store and release energy through the transformation between solid and liquid phases, with high energy storage density and stable physical and chemical properties [9 - 14].Due to their energy storage properties, PCMs are widely used in various energy storage applications such as buildings [15], air conditioners and ...

Among the thermal energy storage systems, latent heat thermal energy storage with a phase change material (PCM) have been aroused concern due to its properties of storing and releasing thermal ...

Tetradecane can be used for the synthesis of thermally stable nano-encapsulated phase change materials (NEPCMs), exhibiting thermal energy storage and heat transfer enhancement applications. It can also be used as an n-alkane model for the study of ignition time measurements for larger n-alkanes.

The storage of latent heat provides a greater density of energy storage with a smaller temperature difference between storing and releasing heat than the sensible heat storage method. ... Zhang Q (2009) Preparation of n-tetradecane-containing microcapsules with different shell materials by phase separation method. Sol Energy Mater Sol Cells 93: ...

PCM have large thermal energy storage density because of its high latent heat of fusion. ... conductivity, but also to improve the properties of MPCM like thermal stability. Fu et al. [58] synthesized MPCM with n-tetradecane as the core and polystyrene as the shell, and grafted a silica shell on the outside of the polystyrene. Then, these MPCMs ...

r Density, kg m Subscripts * Corresponding author. Tel.: +65 6516 2558; fax: +65 6779 1459. ... The latent heat energy storage performance of Tetradecane is measured experimentally. A simple ...

N-Tetradecane is a saturated aliphatic hydrocarbon with the chemical formula C 14 H 30 that is one of the paraffins can be used as PCM. It is a preferable energy storage ...

density. 0.762 g/mL at 20 °C (lit.) ... It is generally used as an organic solvent in synthesis Nonpolar aliphatic solvent, n-tetradecane, is good for aliphatic side chains, but ... Preparation and characterization of nano-encapsulated n-tetradecane as phase change material for thermal energy storage. Fang G, et al. Chemical Engineering ...

Normal tetradecane (n-C 14) has a melting point near 6 °C [4] which makes it suitable for some "low temperature" energy storage applications, like v.g., cold water tanks. The development of models for the description of energy charge and discharge of PCMs, eventually contained in solid structures (v.g., capsules), require thermophysical ...

Due to the high heat carrier density, latent heat functional fluid may be used as the secondary refrigerant in air conditioning system. In this study, two-step in-situ polymerization method is used to synthesis microcapsules of ploy (urea-formaldehyde) (UF), where n-tetradecane is used as core material and SDS as emulsifier.Microcapsules with excellent ...

systems: {n-tetradecane + 1,6-hexanediol} and { n-tetradecane + 1,12-dodecanediol}. In addition, the work provides a systematic analysis of the problem of designing ePCMs with specific properties and the aspects that need to be considered. The possibility of predicting the parameters of eutectic mixtures using the

DOI: 10.1016/J.SOLENER.2015.02.035 Corpus ID: 123095483; Micro/nano encapsulated n-tetracosane and n-octadecane eutectic mixture with polystyrene shell for low-temperature latent heat thermal energy storage applications

Request PDF | Nanoencapsulated n-tetradecane phase change materials with melamine-urea-formaldehyde-TiO2 hybrid shell for cold energy storage | A series of nanoencapsulated phase change ...

Therefore, the main objective of the present study is twofold: (i) to elaborate and thoroughly characterized new nanofluids based on colloidal dispersions of MgO nanoparticles in n-tetradecane for their use in cold energy storage applications and (ii) to propose an empirical model that relates transport properties of nanofluids to understand ...

A novel silica (SiO 2)/n-tetradecane microencapsulated phase change material (MEPCM) was synthesized by in situ interfacial polycondensation. The influences of the amount of the ...

The capacity of n-tetradecane to store heat energy from the container, as well as the rate at which heat interacts between the PCM and the slightly hot air inside the container, serves as determining factors in assessing its feasibility for a power crisis scenario in a ...

The temperature-dependent diffusion of n -tetradecane molecules in the temperature range was analyzed. The phase transition temperature of the system was obtained at 278.5K. The ...

Management of thermal energy systems via latent heat storage is attracting an increasing interest due to high-energy storage density and high ... thermal energy storage system. N-Tetradecane was ...

Phase equilibrium temperature of the homogenous liquid with composition 22% tetradecane versus the storage density (enthalpy change) and the percentage of solidification. ... A phase diagram can give the correct phase transition temperature range and present the energy storage density. If incorrect values are utilized for a cool storage system ...

Thermochemical energy storage gives the highest energy density of all, around 5 to 10 times greater than LHS and SHS, respectively. ... with polymers which are around 0.20 W m -1 K -1. 149 Fu et al. used polystyrene-silica shell for nanoencapsulation of n-tetradecane. 150 The resulting capsules have 150 nm size and 83.38 J g -1 latent ...

The dynamic discharging characteristics of cool thermal energy storage system with coil pipes are studied by a discharging process model according to the energy balance of the phase change material and the heat transfer fluid.The n-tetradecane is taken as phase change material (PCM) and the aqueous ethylene glycol solution with 25% volumetric concentration is ...

Bedecarrats et al. [3] presented a theoretical and experimental investigation of a phase change thermal energy storage system using spherical capsules. Sub-cooling was taken into account in the model. Cheralathan et al. [4] developed a simulation program to evaluate the temperature profiles of heat transfer fluid and phase change material at any axial location and ...

N-Tetradecane is a saturated aliphatic hydrocarbon with the chemical formula C 14 H 30 that is one of the paraffins can be used as PCM. It is a preferable energy storage material for cold storage systems owing to its low phase change ...

A cold storage unit can store the cold energy off-peak and release it for building cooling on-peak, which can reduce the electricity load of air conditioning systems. n-tetradecane is a suitable cold storage material for air conditioning, with a phase change temperature of is 4-8 °C and a phase change enthalpy of 200 kJ/kg. However, its low thermal ...

Semantic Scholar extracted view of "Thermal performance simulations of a packed bed cool thermal

energy storage system using n-tetradecane as phase change material" by Shuangmao Wu et al. ... Phase transition temperature ranges and storage density of paraffin wax phase change materials. Bo He V. Martin F. Setterwall. Materials Science. 2004 ...

Here we show the close link between energy and power density by developing thermal rate capability and Ragone plots, a framework widely used to describe the trade-off ...

An n-tetradecane-polystyrene-silica (Tet-PS-SiO 2) composite nano-encapsulated PCM for cold TES was fabricated by Fu et al. [46]. ... PCMs-based TES still faces limitations in the current level of technology. A higher energy storage density, faster charging and moderate discharging rate, long lifespan, easy delivery mechanisms to the end-user ...

The results can be used in the development of thermal energy accumulators with n-tetradecane. 1 Introduction Non-stationary liquid-solid-liquid phase transitions are ... is used and when charging thermal energy storage devices takes place at night. The accumulators can use ... mass density of stored energy. This is due to the fact that

n-Tetradecane. 4.5-5.6 . 231 . n.a. n-Pentadecane. 10 . 207 . 0.17 . n-Hexadecane. 18.2 . ... In particular, the melting point, thermal energy storage density and thermal conductivity of the ...