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The thermal energy storage characteristics can be estimated from the numerical results. ... Thermal properties of phase-change materials based on high-density polyethylene filled with micro-encapsulated paraffin wax for thermal energy storage. Energy Build, ...

An integration of thermal energy storage system with phase change material (PCM) in a SPV module will improve its overall efficiency by maintaining its temperature. Though, Paraffin is the most common PCM for SPV cooling application, its low thermal conductivity limits its performance.

Abstract This study focuses on the preparation and thermal properties of paraffin/expanded perlite composite as novel form-stable phase change material for latent heat thermal energy storage by vacuum impregnation method. The paraffin could be absorbed in pores of expanded perlite as much as 55 wt% without melted phase change material seepage from the composite and this ...

The LDPE as the supporting matrix kept the molten waxes in compact shape during its phase transition from solid to liquid. Immiscibility of the PCMs (waxes) and the supporting matrix (LDPE) is a necessary property for effective energy storage. Therefore, this type paraffin can be used in a latent heat storage system without encapsulation.

Thermal energy storage characteristics of bentonite-based composite PCMs with enhanced thermal conductivity as novel thermal storage building materials. ... Effects of various carbon nanofillers on the thermal conductivity and energy storage properties of paraffin-based nanocomposite phase change materials. Appl Energy, 110 (2013), pp. 163-172.

Nano-sized high conductive particles are extensively used in many engineering applications to achieve enhanced thermal performance. Paraffin wax is regarded as the most promising phase change material (PCM) for energy storage applications. However, the low thermal conductivity of paraffin poses a challenge which decreases the performance of storage ...

An energy storage system has been designed to study the heat transfer characteristics of paraffin wax during melting and solidification processes in a vertical annulus energy storage system. In the experimental study, three important issues are focused. The first one is temperature distribution in the phase change material

(PCM) during the phase change processes.

Herein, the energy storage performance of amine (NH<sub>2</sub>)-functionalized graphene mixed with paraffin wax (PW) which comprises the advanced phase change material (PCM) is studied. The amine-functionalized graphene is mixed with PW in four different volume percentages like 0.25 volume %, 0.5 volume %, 0.75 volume %, and 1 volume %. Its thermal ...

Research on phase change material (PCM) for thermal energy storage is playing a significant role in energy management industry. However, some hurdles during the storage of energy have been perceived such as less thermal conductivity, leakage of PCM during phase transition, flammability, and insufficient mechanical properties. For overcoming such obstacle, ...

The available literature data on different TES materials show the importance of energy storage in drying applications. A lot of TES materials such as paraffin wax [8], [9], [10], Zinc nitrate hexahydrate, lauric acid [11], HS-58 (an inorganic salt-based phase change material, PCM) [11] are used in solar dryers. Paraffin wax is the mostly used TES material in solar dryers.

Thermal conductivity and latent heat thermal energy storage characteristics of paraffin/expanded graphite composite as phase change material. A Sar?, A Karaipekli. Applied thermal engineering 27 (8-9), 1271-1277, 2007. 1120: 2007:

Paraffin wax also exhibits poor heat transfer characteristics, which in turn results in an inefficient thermal energy storage system. Hence, the main objective of this research is to use thermally conductive nanomaterials to boost the thermal conductivity of paraffin composites.

Request PDF | Thermal conductivity and latent heat thermal energy storage characteristics of paraffin/expanded graphite composite as phase change material | This study aimed determination of ...

Latent heat thermal energy storage systems (LHTESS) are versatile due to their heat source at constant temperature and heat recovery with small temperature drop. In this context, latent heat thermal energy storage system employing phase change material (PCM) is the attractive one due to high-energy storage density with smaller temperature difference ...

In the context of dual-carbon strategy, the insulation performance of the gathering and transportation pipeline affects the safety gathering and energy saving management in the oilfield production process. PCM has the characteristics of phase change energy storage and heat release, combining it with the gathering and transmission pipeline not only improves ...

Furthermore, this study investigated the effect of porosity on the heat storage efficiency at different system inclination angles. Results indicate that, in a vertical configuration, the melting rates of foam metal structures at 20 PPI and 30 PPI are comparable and ...

Paraffin wax has received considerable attention in thermal energy storage because of its good thermal physical properties, including a suitable melting temperature, high latent heat energy, negligible supercooling, and stable chemical and thermal performance .

1 MELTING / SOLIDIFICATION CHARACTERISTICS OF PARAFFIN BASED NANOCOMPOSITE FOR THERMAL ENERGY STORAGE APPLICATIONS S. Lokesh a, aP. a, \*Murugan a, A. Sathishkumar, V. Kumaresan, R. Velraj a a ...

Moreover, the research encompassed the preparation of paraffin into 2, 3, and 4 mm particles, which were integrated into a filling body to create an energy storage filling body (ESFB). Ultimately, employing the response surface methodology, the research probed the ...

Energy storage is a vital part of energy saving and power supply, as energy demand and energy availability often does not coincide in time. Storing thermal energy, sensible, latent and thermochemical energy storage are the three main ways.

The goal of this research is to compare the thermal energy storage of the composites of graphene/paraffin and expanded graphite/paraffin for low-temperature applications and understand the role of graphene and expanded graphite in this regard.

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Sar? A, Karaipekli A. Thermal conductivity and latent heat thermal energy storage characteristics of paraffin/expanded graphite composite as phase change material. Applied Thermal Engineering. 2007; 27(8-9): 1271-1277. doi: 10.1016/j.applthermaleng.2006.11.004. 16. ...

Phase-change materials (PCMs) are essential modern materials for storing thermal energy in the form of sensible and latent heat, which play important roles in the efficient use of waste heat and solar energy. In the development of PCM technology, many types of materials have been studied, including inorganic salt and salt hydrates and organic matter ...

3 &#0183; Comparative analysis of thermal charging and discharging characteristics in PCM-based energy storage systems with and without pin fins. Published: 11 November 2024 ... finding that copper foam/paraffin

composites ...

Experimental study of thermal energy storage characteristics of a paraffin in a horizontal tube-in-shell storage unit. M. Avcı M. Yusuf Yazıcı. Materials Science, Engineering. 2013; 125. Save. EXPERIMENTAL STUDY ON SOLAR ENERGY STORAGE IN PHASE CHANGE MATERIALS USING CYLINDRICAL SHELL TYPE HEAT EXCHANGER.

Lokesh, S., et al.: Melting/Solidification Characteristics of Paraffin Based ... THERMAL SCIENCE: Year 2017, Vol. 21, No. 6A, pp. 2517-2524 2517 MELTING/SOLIDIFICATION CHARACTERISTICS OF PARAFFIN BASED NANOCOMPOSITE FOR THERMAL ENERGY STORAGE APPLICATIONS by Selvam LOKESH, Pachappan MURUGAN, Anbalagan ...

This study investigates the integration of graphene nanoplatelets and nano SiO<sub>2</sub> into paraffin wax to enhance its thermal energy storage capabilities. Dispersing graphene nanoplatelets and nano SiO<sub>2</sub> nanoparticles at weight percentages of 0.5 and 1.0 respectively, in paraffin wax yielded mono and hybrid phase change materials (HYB). Transmission electron ...

The increasing demand for energy supply and environmental changes caused by the use of fossil fuels have stimulated the search for clean energy management systems with high efficiency [1]. Solar energy is the fastest growing source and the most promising clean and renewable energy for alternative fossil fuels because of its inexhaustible, environment-friendly ...

Studies showed that paraffin could offer desirable thermal energy storage characteristics. However, its low thermal conductivity can negatively impact the heat transfer efficiency by prolonging the heat charging and discharging rate of PCM [35, 44-47]. Consequently, PCM may not meet sufficiently the specific requirements in terms of thermo ...

Thermal energy storage characteristics of carbon-based phase change composites for photo-thermal conversion. Author links open overlay panel Lei Shi a ... and battery thermal management [[20], [21], [22]]. Paraffin wax (PW), with its appropriate phase change temperature as well as high latent heat, has been extensively employed in a number of ...

As an inexpensive and easily available organic phase change material (PCM), paraffin has good energy storage effect and can realize efficient energy storage and utilization. In this work, paraffin section-lauric acid (PS-LA) and paraffin section-myristic acid (PS-MA) ...

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