

Passive and low-energy cooling alternatives based on solar protection, heat dissipation, heat modulation and heat prevention have enormous potential to reduce heat's impact on the built environment [[13], [14], [15]]. Moreover, they can be explicitly integrated to benefit from local resources and improve their performance according to specific constraints, such as power ...

In charge and discharge processes of heat sources, the temperature variations of materials in the energy storage tank are illustrated by changing the heating conditions as shown in Figure 5. Figure 5(a), the maximum temperature of the DI-water in the storage tank reaches 44.9 °C, and the corresponding equilibrium time is up to 2050 s. When the heat source temperature reaches ...

Heat energy is transferred from a heat source to thermoelectric elements via heat pipes, enabling energy conversion. To dissipate excess heat from the system after conversion, additional heat pipes are positioned on the cold sides of thermoelectric elements. Cooling of the condenser sections of these heat pipes is facilitated using air flow ...

With the increasing demand for renewable energy worldwide, lithium-ion batteries are a major candidate for the energy shift due to their superior capabilities. However, the heat generated by these batteries during their operation can lead to serious safety issues and even fires and explosions if not managed effectively. Lithium-ion batteries also suffer from significant ...

The heat pipe is an efficient transfer element that has been used in battery thermal ... the heat dissipation effect in the heat management system of the integrated battery pack with heating and heat dissipation is enhanced due to the heat exchange of the heating part. ... J. Energy Storage, 27 (Feb) (2020), 10.1016/j.est.2019.101059. 101059.1 ...

As the heat dissipation capability in the HDS improved, the transmission of heat generated from the hot surface to the cold surface via Fourier heat conduction decreased. ... Heat pipe based cold energy storage systems for datacenter energy conservation. Energy, 36 (5) (2011), pp. 2802-2811, 10.1016/j.energy.2011.02.021. View PDF View article ...

Robak et al. (2011) experimentally investigated latent heat thermal energy storage (LHTES) using heat pipes. Results showed that for the solidification case, the heat pipe-assisted scheme had nearly double solidification rates compared to the benchmark case without heat pipes and fins. ... This result indicates that the thermal dissipation of ...

A heat pipe is a passive heat transfer device that efficiently transports heat from one point to another. It

Heat pipe energy storage and heat dissipation

operates based on the principles of phase change and fluid dynamics to facilitate the rapid transfer of thermal energy. Heat pipes are widely used in various applications where effective heat dissipation is crucial, such as in ...

The optimum combination of factors affecting the cooling effect of gravity heat pipes in coal storage piles was experimentally derived. ... the combination of heat pipe heat dissipation technology and temperature difference power generation technology can be used to convert the waste heat of coal pile into electric energy, but the conversion ...

The exponential increase in fossil fuels resulted in global warming and other serious health issues [1], [2], [3]. Recent development of different renewable energy resources that are sustainable and have no or low environmental impacts [4], [5], [6], as well as improving the current processes through waste heat recovery [7], [8] can significantly minimize such effects.

This paper experimentally investigates heat dissipation of a heat pipe with phase change materials (PCMs) cooling in a multiple heat source system. Two heat sources are fixed at one ...

In addition, the nanoparticle CuO with various mass fractions will be analyzed to find a way to improve the thermal dissipation performance of the heat pipe. Finally, the performance of the heat pipe under two fan powers and two heating powers is discussed in this paper. ... Latent heat thermal energy storage (LHTES) has been used to deal with ...

The thermal performance of three heat dissipation methods including forced air cooling, bottom liquid cooling and heat pipe coupled liquid cooling were compared. ... Numerical investigation of thermal management of lithium ion battery pack with nano-enhanced phase change material and heat pipe. Journal of Energy Storage, 77 (open in a new ...

The heat dissipation of the heat pipe will reduce the phase transition rate of PCM but have less effect on the heat transfer between the battery and PCM. Thus, the battery temperature in ... and stability study of a form-stable erythritol/expanded graphite composite phase change material for thermal energy storage. Renew Energ, 136 (2019), pp ...

The thermal management of battery systems is critical for maintaining the energy storage capacity, life span, and thermal safety of batteries used in electric vehicles, because the operating temperature is a key factor affecting battery performance. Excessive temperature rises and large temperature differences accelerate the degradation rate of such ...

Flat heat pipe (FHP) is a relatively new type of battery thermal management technology, which can effectively maintain the temperature uniformity of the battery pack. We have constructed a resistance-based thermal model of the batteries considering the impact of the state of charge (SOC), battery temperature, and current on

the battery heat ...

Lithium-ion batteries have many advantages such as long cycle life, high power density and relatively low discharge speed, so in recent years they have played an important role as the main source of power for various industries such as electric vehicles (EV) and solar energy storage tanks [1] order to provide high electric energy in large-scale applications, especially ...

With the reduction in fossil fuels and growing concerns about global warming, energy has become one of the most important issues facing humanity. It is crucial to improve energy utilization efficiency and promote a low-carbon transition. In comparison with traditional heat exchangers, heat pipe heat exchangers indicate high compactness, a flexible ...

This paper improves the thermal management system of lithium-ion battery through the high thermal conductivity flat heat pipe, and attempts to improve its performance. The adoption of flat heat pipes reduces the problem of poor heat dissipation in the direction of the coolant flow when the liquid cooling plate is used alone, and increases the heat conduction in the longitudinal ...

Researchers have proved the effect of foam metal in improving the thermal conductivity and temperature uniformity of PCM through heat transfer experiments [21, 22], visualization experiments [23], theoretical calculations [24] and numerical simulations [25, 26]. Sathyamurthy et al. [27] used paraffin as an energy storage medium in recycled soda cans ...

Heat pipe technology is widely used for the extraction of deep geothermal energy [202] which can be found at a depth of 3-10 km from the ground surface. It is a low-carbon ...

The total of the sensible heat and latent heat leads to the total energy stored in the PCMs. Hence, the PCMs is extensively used for electronic cooling applications, as it stores ...

1 INTRODUCTION. Lithium ion battery is regarded as one of the most promising batteries in the future because of its high specific energy density. 1-4 However, it forms a severe challenge to the battery safety because of the fast increasing demands of EV performance, such as high driving mileage and fast acceleration. 5 This is because that the battery temperature ...

Al-Hallaj et al. [17] designed different modes of heat dissipation for Li-ion battery modules and tested at various constant C-rates, ... Numerical study of finned heat pipe-assisted thermal energy storage system with high temperature phase change material. Energy Convers Manage, 89 (2015), pp. 833-842.

The system uses lithium heat pipe cooling, heat pipe-fuel composite elements, Brayton energy conversion, and heat pipe radiator heat dissipation. The power is at the megawatt level, and the system has a total of reactors plus two loops: ... (H-MMR) with a renewable energy and energy storage system (ESS) to generate 10 MWe

of electricity.

Pulsating Heat Pipe (PHP) is an emerging efficient heat transfer device, that transfers heat passively through oscillating motions of liquid slugs and vapor plugs within the device. PHP is of high effective thermal conductivity with great potential in heat transfer management for various applications. The objective of this review paper is to summarize and ...

The heat pipe technology works on the principle of evaporative heat transfer and has been widely used in heat storage systems. Wu et al. [14] first studied the thermal dissipation system of the lithium-ion battery based on the heat pipe technology in 2002 and compared thermal performance of natural convection, forced convection and heat pipe ...

A numerical study of viscous dissipation effects on heat transfer, thermal energy storage by sensible heat and entropy generation within a porous channel with insulated walls was carried out in a ...

For the thermal performance enhancement of electronic components under intermittent high heat load, this paper proposes a gravity heat pipe with heat storage (GHPHS) ...

R_1 and R_{10} are resistances at the external surface of heat pipe -source and external surface of heat pipe--sink, respectively.. R_2 and R_8 are the thermal resistances of the heat pipe wall.. R_3 and R_7 are the thermal resistances of the wick structure.. R_4 and R_6 represent the thermal resistance corresponding to the vapour-liquid surfaces.. R_5 is the thermal ...

In 1964, RCA was the first commercial organisation to perform heat pipe research. Due to its commendable ability to transport heat energy, the use of heat pipe is becoming popular, starting from space shuttles, electronic industry, ...

Through the melting and solidification of PCM, it is found that adding heat pipes can improve the thermal performance of the system. Tiari et al. [99] conducted a numerical study on the thermal characteristics of a finned heat pipe-assisted latent heat energy storage system. They found that natural convection has a strong influence on the ...

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