High temperature heat pipe solar energy

What is a high temperature heat pipe?

It can be applied to the areas such as solar energy storage system and waste heat recovery. High temperature heat pipes with 420 mm in length, 13 mm in outer diameter and 2 mm in tube thickness have been developed and tested. The device was made of Inconel 600 equipped with a 316 stainless- steel 100 mesh wick.

Can a heat pipe solar receiver increase evaporator temperature?

The impact of the number of flow passes of the cooling fluid in the receiver tube and the concentrated heat flux density on the receiver efficiency and evaporator temperature were studied. The results obtained show that the proposed concept of heat pipe solar receiver can increase the daily operating duration of the receiver.

Can heat pipes be used in solar systems?

Finally, by employing heat pipes in solar systems the hydraulic resistance of the heated fluid can be reduced by more than twice, due to the fact that the working fluid passes through the condenser part of the heat pipe only, instead of the whole structure .

Can heat pipes be used in a high temperature environment?

The addition of heat pipes in such a high temperature environment could be problematic,as the shape of the heat pipe must be functional but not compromise the cooling of the product. Heat pipes can also be applied in the waste heat recovery industry in the form of thermosyphon Rankine cycle systems.

What is the thermal efficiency of a heat pipe solar collector?

According to the literature,the thermal efficiency of ETC ranges between 65 and 80%,whereas the heat pipe flat solar collectors' thermal efficiency reaches up to 68%. Heat pipes are also employed in photovoltaic/thermal applications (PV/T).

Why do solar collectors use heat pipes?

The implementation of heat pipes in solar collectors prevents the freezing and the backflow of the working fluid during night time. Thus,the heat pipe acts as a thermal diode which transfers the heat in only one direction ,. As a result,more stable operating conditions are achieved .

The high-temperature heat-pipe reactor (HTPR) is considered to be one of the most promising IDIR [15].As shown in Fig. 1, the HTPR is comprised of a heat transfer cavity, which is brimmed with a heat transfer medium, and a reaction cavity, which is packed with steam reforming catalysts.The concentrated solar power is illuminated on the outwall of the HTPR ...

High temperature can severely reduce the solar panel"s production of power. Higher temperature increases the conductivity of the semi conductor charges become balanced within the material, reducing the magnitude of the electric field, inhibiting the charge separation, which lowers the voltage across the cell.

High temperatures in photovoltaic (PV) modules lead to the degradation of electrical efficiency. To address the challenge of reducing the temperature of photovoltaic modules and enhancing their electrical power output efficiency, a simple but efficient photovoltaic cooling system based on heat pipes (PV-HP) is introduced in this study.

This study aims to present a novel thermal energy storage integrated evacuated tube heat pipe solar air heater suitable for high-temperature applications. A new heat pipe arrangement was introduced in this study by attaching all the evaporator tubes of heat pipes to a common condenser section. A thermal energy storage medium was kept in a ...

Heat pipe play an important role in high temperature energy transfer system and storage ...

A specially configured high temperature heat pipe for solar energy storage systems was proposed by Mahdavi et al. [97]. Sodium was chosen as the working fluid due to its low vapour pressure at high temperatures. Heat transfer limits of the heat pipe were determined, which were caused by heat pipe geometry, working fluid, wick structure, and ...

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Effects of combined heat pipes and PCM (as thermal energy storage material), Effects of ...

Heat pipe play an important role in high temperature energy transfer system and storage system. It can be applied to the areas such as solar energy storage system and waste heat recovery. High temperature heat pipes with 420 mm in length, 13 mm in outer diameter and 2 mm in tube thickness have been developed and tested.

A thermal network model is developed and used to analyze heat transfer in a high temperature latent heat thermal energy storage unit for solar thermal electricity generation. Specifically, the ...

A loop-type heat pipe was fabricated and tested to transport high-temperature thermal energy from a solar receiver in a CSP application. The purpose of the heat pipe in this study was to transport ...

This approach provides valuable guidance for calculating near-wall heat transfer in heat pipes. High-temperature heat pipes also find applications in solar energy receivers. Daabo et al. [10] studied the optimal shape parameters analysis of small-scale cavity receivers in the application of solar closed Brayton cycles. Through numerical ...

However, conventional all-glass solar vacuum tubes are characterized by high-temperature heat energy retention, significant resistance to heat energy output, and limited frost resistance during colder seasons.

Furthermore, there is a relative scarcity of research on the synergistic effects of CPC-coupled heat pipes, with most numerical simulations of heat pipes being two-dimensional ...

First, the impact on the performance of three main components of HTHPs over the past 30 years is introduced: the working fluid, the HTHP structure, and the wick structure. Herein, it is a considerable review of the ...

Using the heat pipes as heat transfer and heat exchange design elements allows creating new effective equipment generation for solar energy systems. Heat pipes are widely used both...

Using the heat pipes as heat transfer and heat exchange design elements ...

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