

Investigation of pork fat as potential novel phase change material for passive cooling applications in photovoltaics J. Clean. Prod., 170 (Jan. 2018), pp. 1006 - 1016, 10.1016/j.jclepro.2017.09.164

Photovoltaic (PV) modules are considered one of the most significant applications of solar energy. It converts some of the solar radiation falling on it into electrical power, and the remaining part of the solar energy is absorbed in the form of heat.

The main problem with pork fat is the long-term stability of the physical properties and which should be further investigated with cyclic testing. ... Experimental study on thermal management and performance improvement of solar PV panel cooling using form stable phase change material. Energy Sources, Part A Recovery, Util Environ Eff (2020 ...

Numerically, the best PV cooling effect was reached for 45°; wind angle while the worst was achieved for a wind angle of about 20°. Furthermore, this phenomenon was confirmed by experimental data. ... (pork fat, i.e. animal fat as a cheap and organic PCM). ... A large part of incident solar radiation on photovoltaic (PV) modules is converted ...

This paper considers pork fat as a novel potential phase change material (PCM) for photovoltaic applications. The PV-PCM configuration was numerically analysed in order to investigate the main performance parameters and its general thermal behaviour regarding passive cooled photovoltaic panels (a simplified one-dimensional finite difference code was applied for ...

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Ni?eti? et al.,2018 investigated that the Pork fat was considered a PCM for cooling PV systems. The study found that pork fat performed similarly to conventional organic PCMs. This similarity in performance was attributed to the pork fat, and the conventional PCMs had similar physical goods, such as a similar latent heat of fusion and melting ...

The application of pork fat in PV cooling was recommended, particularly if compared with inorganic PCMs. In addition, it was mentioned that pork fat could efficiently ...

An investigation of pork-fat as a novel PCM material for PV-PCM cooling was elaborated in (Ni?eti? et al., 2018a,b). The study revealed that pork fat could be a viable PCM material regarding thermal properties and a simulation study was conducted for two cities in Turkey through the developed numerical model.

The application of pork fat in PV cooling was recommended, particularly if compared with inorganic PCMs. In addition, it was mentioned that pork fat could efficiently behave in active systems where waste heat can be

recovered. Besides, more intensive experimentations on long-term degradation of its physical properties should be conducted.

Ebaid et al, 2018 [16] Investigates the use of Nanofluid in solar PV cooling. ... of pork fat as potential novel phase change material for passive cooling applications in photovoltaics, J ...

Solar energy has been a vital renewable energy source for humanity for decades. Researchers have proposed many strategies to harness the same but solar photovoltaic (PV) is the only technology which has reached commercial scale and highly successful in meeting renewable energy goals of many countries. The major drawback of PV systems is that increase in the ...

Cooling of photovoltaic panels (PV) by using phase-change materials (PCM) becomes a popular research technique due to the high latent energy storage capacity of PCMs. Therefore, the ...

Integrating nanoparticles into PCM to create Nano-Phase Change Material (NPCM) can significantly improve the thermal conductivity of PCM, thereby enhancing the heat exchange efficiency with PV panels [37, 38]. Yu et al. [39] added NPCM to metal foam and experimentally investigated its impact on the thermal characteristics of solar power generation, finding that ...

Photovoltaic (PV) panels are one of the most important solar energy sources used to convert the sun's radiation falling on them into electrical power directly. Many factors affect the functioning of photovoltaic panels, including external factors and internal factors. External factors such as wind speed, incident radiation rate, ambient temperature, and dust accumulation on ...

Fig. 8. Solar to electricity energy conversion efficiency for specific considered days in the Months as well as geographical location of Split. - "Investigation of pork fat as potential novel phase change material for passive cooling applications in photovoltaics"

Comparing with other PV cooling technologies, the significant feature of PV-PCM system comes from the latent heat storage capacity of PCMs. ... [101] who examined pork fat, mainly made up of fatty acids, as PCM in a PV-PCM system [114]. Actually, fatty acids and their derivatives have nearly same potential as paraffin for thermal energy storage ...

They reported that though pork fat is a potential PCM for solar PV cooling but its cost is still not economical. Müslüm et al. [22] also developed a numerical model for analyzing performance

As mentioned earlier, the PVT-PCM system operates in two operating modes. The primary cooling system is passive based on an organic PCM, i.e. pork fat. For the first time, pork fat was used as a PCM for the thermal management of a specific energy system, which in the process of phase transition absorbs heat from the PV panel.

Solar photovoltaic cooling pork fat

These oils have proven to be PCM characterized by high enough latent heat, good chemical stability, endurance stability for 1000 heating/cooling cycles. Since they are fully hydrogenated, they do not undergo oxidation processes. Among the animal fats, pork fat [15] has been investigated as a PCM for passive cooling applications in photovoltaics.

The rapidly growing use of photovoltaic systems depicts its importance in the field of power generation in the near future. Photovoltaic panel absorbs 80% of the incident solar radiation and converts 20% of this absorbed energy into electrical energy depends upon the efficiency of photovoltaic panel, remaining absorbed energy get converted into heat causes ...

Performance enhancement and infra-red (IR) thermography of solar photovoltaic panel using back cooling from the waste air of building centralized air conditioning system. Case Stud.Therm.Eng. (2021) H ... Techno-economic and environmental evaluation of photovoltaic-thermal collector design with pork fat as phase change material. Energy, Volume ...

In the same spatial setting (Croatia), the environmental sustainability of a biobased (pork fat) PCM system for the cooling of a photovoltaic-thermal (PVT) collector was also examined, and the ...

This paper presents the results of an experimental study on the effect of cooling of solar photovoltaic (PV) panels by evaporative cooling. The evaporation latent heat was utilized to absorb the ...

The use of phase change materials (PCMs) is widely investigated in different applications in the solar energy field. Most of the research works were directed to the investigation of performance indicators, while the limited number of the works has considered an economic aspect, which is crucial one towards potential large-scale applications. This work is focused on ...

DOI: 10.1016/J.JCLEPRO.2017.09.164 Corpus ID: 158788067; Investigation of pork fat as potential novel phase change material for passive cooling applications in photovoltaics @article{Niet2018InvestigationOP, title={Investigation of pork fat as potential novel phase change material for passive cooling applications in photovoltaics}, author={Sandro Ni{vz}eti{"c} and ...

Investigation of pork fat as potential novel phase change material for passive cooling applications in photovoltaic, Journal of Cleaner Production, ... (IR) thermography of solar photovoltaic panel using back cooling from the waste air of building centralized air conditioning system, Elsevier Ltd, 2021. Google Scholar . 29. Jan. Wajs,

A novel passive refrigeration technique for cooling solar photovoltaic (PV) panel using the Capillary pumped loop (CPL) system to improve PV electrical conversion efficiency is proposed in this work.

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Solar photovoltaic cooling pork fat

The energy and environmental performance of photovoltaic (PV) panel cooling, when using phase change materials (PCMs), was examined. Actual, long-term field data were collected from a PV and a PV ...

The active cooling side of the system is denoted by a specially designed aluminum absorber with water flow, whereas the pork fat as organic PCM is used for the passive cooling side. As a result, cooling the PV modules is essential that should be examined carefully.

The passive cooling component was ensured by pork fat as cheap and organic PCM, while the active cooling part was provided via a specially designed aluminum absorber, with enabled water circulation (working fluid). ... Performance of a photovoltaic-thermal solar collector using two types of working fluids at different fluid channels geometry ...

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