

THERMAL ENERGY STORAGE MATERIALS FOR PERFORMANCE IMPROVEMENT OF SOLAR COOKERS

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ABSTRACT

Solar energy is available free of cost can be utilized in many applications. The utilization of solar energy for cooking applications has found a great impact. Various innovations have been employed for facilitating the cooking during non-sunshine hours. The use of energy storage materials helps in overcoming the fluctuations in supply of the energy required for cooking during different time periods of the day. This paper focuses on the different type of thermal energy storage materials that are currently utilized in solar cooking. Primarily oils and pebbles are mostly used as sensible heat storage (SHS) while organic PCMs are used as latent heat thermal energy storage materials (LHTES).

The properties and performances of various sensible and latent heat thermal storage materials have been compared for their proper utilization. SHS materials are cost effective but have lower thermal gradient compared to LHTES materials. The storage capacity of LHTES is high while the degradation with increasing number of charging and discharging cycles is also considerable. Melting point of materials should be close to the working temperature for being used as LHTES while the thermal diffusivity of the materials greatly influences the performance of solar cookers. The cooking time was lowered for the solar cooking systems equipped with energy storage compared to non-equipped cookingsystems. It is recognized that the use of energy storage has been proved as a huge advantage to solar cooking systems however the design, heat transfer characteristics of the cooking vessel along with the storage material type and volume must be optimized in order to make this technology more influential.

Keywords: Solar Cooker, Sensible Heat Storage, Latent Heat Storage and Storage Capacity

