Phase change materials integrated solar thermal energy systems : global trends and current practices in experimental approaches

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ABSTRACT

Solar thermal systems (STSs) are gaining boom in the globalized market since last two decades to combat the menace of global warming. Considerable research has been carried out in the field of solar thermal system for efficiency enhancement. Improvement in terms of efficiency and performance would make solar thermal systems a better option for replacing the conventional energy systems. Phase change Materials (PCMs) have emerged as an alternative to enhance the performance of the solar heating systems by acting as thermal storage batteries. In this review article an attempt has been made to consolidate the global trends and practices that has been underwent incorporating Phase change materials (PCMs) in solar thermal systems. Research on PCM based solar cooker has found to be extinct. PCM based PCM based high temperature power plant applications are on current trends of research. Application of phase change materials for low, medium and high temperature solar thermal systems are comprehensively reviewed and discussed in this article. As well the environmental benefits in terms decline in CO_2 emission, due to the use of STS in day-today life and the economic analysis of PCM based STS in terms of cost and payback period is presented.

KEYWORDS

Energy; Phase change materials; Solar thermal systems; Thermal energy storage

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