Investigation of thermal performance and chemical stability of graphene enhanced phase change material for thermal energy storage

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ABSTRACT

Phase change materials (PCMs) have received widespread thermal energy storage (TES) and release properties due to their unique characteristics. However, the PCMs suffer from poor thermal conductivity, resulting in the least thermal performance and heat transfer characteristics. This research focused on enhancing the heat transfer and storage characteristics by developing an organic paraffin wax composite by dispersing highly conductive graphene powder using a two-step technique. The results show that the developed nano enhanced PCM significantly improves the thermal conductivity by 72.2% at 0.6 wt% of graphene powder. Furthermore, the Fourier transform infrared spectrum shows there is no additional peak observed, means physically and chemically stable, and the reduced light transmission capability was enhanced by 32.0% than pure PCM. Due to its extreme characteristics, the developed PCM is an outstanding material for medium temperature solar thermal energy storage applications.

KEYWORDS: Phase change materials, Energy storage, Thermal conductivity, Nanoparticles, Paraffin

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