

Thermal and Flammability Properties of Paraffin/Nanoclay Composite Phase Change Materials Incorporated in Building Materials for Thermal Energy Storage

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Abstract : In this study, a form-stable composite Paraffin/Nanoclay (PA-NC) has been prepared by absorbing PA into porous particles of NC to be used for low-temperature latent heat thermal energy storage. The leakage test shows that the maximum mass fraction of PA that can be incorporated in NC without leakage is 60 wt.%. Differential scanning calorimetry (DSC) has been used to measure the thermal properties of the PA and PA-NC both before and after incorporation in plasterboard (PL). The mechanical performance of the samples has been evaluated in flexural mode. The thermal energy storage performance has been studied using a small test chamber (100 mm \times 100 mm \times 100 mm) made from 10 mm thick PL and measuring the temperatures using thermocouples. The flammability of the PL+PL-NC has been discussed using a cone calorimeter. The results indicate that the form composite PA has good potential for use as thermal energy storage materials in building applications.

Keywords : building materials, flammability, phase change materials, thermal energy storage

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