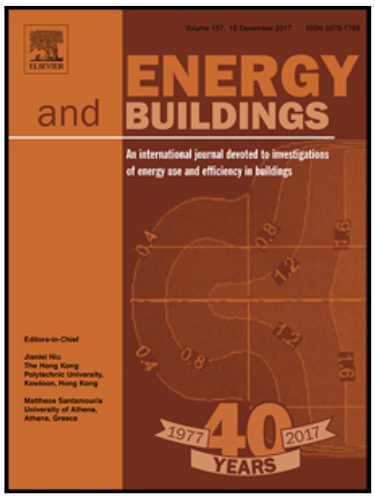

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Fabrication and characterization of fatty acid/wood-flour composites as novel form-stable phase change materials for thermal energy storage

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Abstract

The fatty acid (FA)/wood-flour (WF) composite form-stable phase change materials (PCMs) were prepared *via* a direct impregnation method, in which WF was selected as the supporting materials. The surface morphology, chemical structure, crystalline structure, phase change properties, thermal reliability and stability of the prepared FA/WF composite form-stable PCMs were investigated by scanning electron microscopy (SEM), Fourier transform infrared spectrometer (FTIR), X-ray diffraction (XRD), differential scanning calorimeter (DSC), accelerated thermal cycling testing and thermogravimetric analysis (TG), respectively. SEM images showed that the porous spaces of WF can be largely occupied by the impregnated FA without leakage. FTIR and XRD results suggested that there was no chemical reaction but only physical interactions between WF and FA. XRD analysis also demonstrated that the WF had no effect on the crystallization of FA. The prepared FA/WF composite PCMs had high latent heats and a suitable phase change temperature range, especially the maximum latent heats in melting and freezing process for the HW-FSPCM reached 102.6 J/g and 103.5 J/g. The prepared FA/WF composite PCMs exhibited comprehensive thermal reliability and stability from the thermal cycling test and TG analysis.

Keyword: Form-stable phase change material; Wood-flour; Fatty acids; Thermal properties.