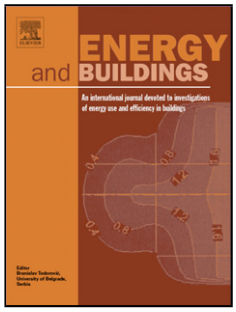

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Phase Change Materials of Paraffin in h-BN Porous Scaffolds with Enhanced Thermal Conductivity and Form Stability

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Abstract: Low thermal conductivity and leakage after melting are the two main issues limited the application of phase change materials (PCMs). Here, to improve the thermal conductivity and hamper the leakage after melting, PCMs were fabricated by infiltrating paraffin into h-BN porous scaffolds with continuous thermal conductive paths. The latent heat of fusion of the resultant PCMs containing 18 wt% h-BN was 165.4 ± 1.7 J/g, and the thermal conductivity was as high as 0.85 W/mK. The thermal conductivity increased approximately 600% compared to the pure paraffin, and was over twice of the composites fabricated by conventional blending of paraffin and h-BN. The enhanced thermal conductivity obviously shortened the phase change process, indicating more efficient in energy storage and release. In addition, the h-BN scaffolds endowed the PCMs shape stability under molten state and prevented the leakage of molten paraffin. This approach to fabricate form-stable PCMs with high thermal conductivity may extend to other thermal management applications.

Key words: boron nitride, paraffin, phase change materials, scaffold, thermal