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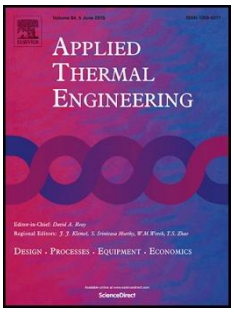

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Characterization and numerical simulation on Heat Transfer performance of Inorganic Phase Change Thermal Storage Devices

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Highlights

• Thermal physical properties of $Ba(OH)_2 \cdot 8H_2O$ as hydrate salt PCM was investigated.

• Thermal cycling test was used to evaluate the reliability of the PCM.

• The corrosion of $Ba(OH)_2 \cdot 8H_2O$ on four metals were studied.

• The numerical modeling was conducted to study the heat transfer device.

• Effects of key parameter on the heat transfer device were investigated.

Abstract: Inorganic hydrated salt $Ba(OH)_2 \cdot 8H_2O$ is one of most potential thermal storage materials in the low-medium temperature range due to its highest latent heat per unit volume. Thermal stability tests, super-cooling and corrosion investigations of $Ba(OH)_2 \cdot 8H_2O$ on four metal materials were conducted, thermal cycling tests revealed that $Ba(OH)_2 \cdot 8H_2O$ as PCM had a good thermal reliability, the super-cooling increased and then stabilized after 300 thermal cooling cycles, the corrosion investigations showed that the copper had the strongest resistance corrosion performance. Furthermore, using copper as finned-tube and cylindrical shell and $Ba(OH)_2 \cdot 8H_2O$ as phase change material (PCM), numerical simulation of heat exchangers was carried out. The simulation results showed higher heat transfer efficiency was associated with the greater

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