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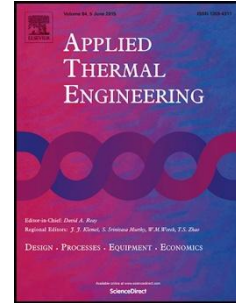
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Characterization and numerical simulation on Heat Transfer performance of Inorganic Phase Change Thermal Storage Devices

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Highlights

- Thermal physical properties of $\text{Ba}(\text{OH})_2 \cdot 8\text{H}_2\text{O}$ as hydrate salt PCM was investigated.
- Thermal cycling test was used to evaluate the reliability of the PCM.
- The corrosion of $\text{Ba}(\text{OH})_2 \cdot 8\text{H}_2\text{O}$ 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 $\text{Ba}(\text{OH})_2 \cdot 8\text{H}_2\text{O}$ 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 $\text{Ba}(\text{OH})_2 \cdot 8\text{H}_2\text{O}$ on four metal materials were conducted, thermal cycling tests revealed that $\text{Ba}(\text{OH})_2 \cdot 8\text{H}_2\text{O}$ 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 $\text{Ba}(\text{OH})_2 \cdot 8\text{H}_2\text{O}$ 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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