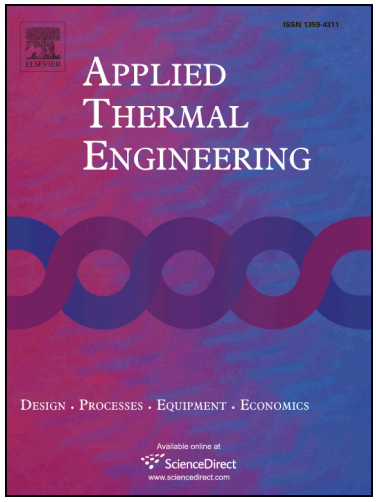

Thermal energy storage using chloride salts and their eutectics

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ABSTRACT

Achieving the goals of the U.S. Department of Energy (DOE) Sunshot initiative requires 1) higher operating temperatures for concentrating solar power (CSP) plants to increase theoretical efficiency, and 2) effective thermal energy storage (TES) strategies to ensure dispatchability. Current inorganic salt-based TES systems in large-scale CSP plants generally employ molten nitrate salts for energy storage, but nitrate salts are limited in application to lower temperatures—generally, below 600°C. These materials are sufficient for parabolic trough power plants, but they are inadequate for use at higher temperatures. At the higher operating temperatures achievable in solar power tower-type CSP plants, chloride salts are promising candidates for application as TES materials, owing to their thermal stability and generally lower cost compared to nitrate salts.

In light of this, a recent study was conducted, which included a preliminary survey of chloride salts and binary eutectic systems that show promise as high temperature TES media. This study provided some basic information about the salts, including phase equilibria data and estimates of latent heat of fusion for

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