

# Encapsulation of Thermal Energy Storage Media

**R**esearchers at the University of South Florida have discovered a novel method by which to encapsulate phase change materials (PCMs) for thermal energy storage (TES).

TES is an often unrecognized, yet important, component of the developing market for energy storage systems. TES systems are seen as an effective means of shifting electricity use from daytime peak periods into less expensive periods of the day or night, saving money and increasing overall system efficiency. Newer forms of TES, including molten salt storage, may be used with concentrated solar power generation facilities to store energy collected in daylight hours for later use. However, this system requires expensive, bulky equipment. Encapsulated PCMs allow for the storage of large amounts of heat in small volumes, thus reducing the cost of storage tanks and associated equipment. The capsules must be able to withstand large numbers of heating and cooling cycles without degradation, but they are a promising way to make TES more cost-effective.

Our researchers have developed a novel method of manufacturing PCMs that involves coating the PCM in a flexible material to allow for the expansion and shrinkage of the pellet during phase changes and then coating the pellet in metal to extend its lifespan. Initial testing with a potassium nitrate-sodium nitrate coating showed that the pellets lasted for over 2,000 thermal cycles at 202-242°C with little degradation. These properties make the novel PCMs ideal for industrial applications in solar plants and other power plants. Additionally, they are easily implemented as they can be retrofitted to existing TES systems or designed for new TES systems.

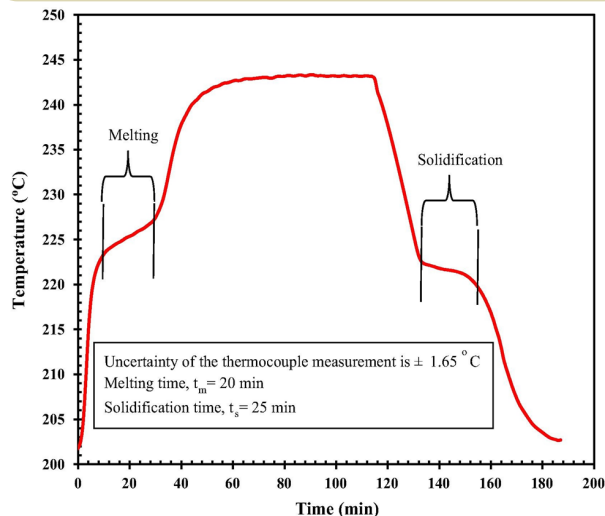
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### ADVANTAGES:

- Accommodates expansion of PCMs at elevated temperatures
- Withstands more thermal cycles than current TES systems
- Greater amount of energy storage
- Can be used for new or existing TES systems

### *Novel Encapsulation Methods of Phase Change Materials*



### *Phase Change Characteristics of Potassium Nitrate-Sodium Nitrate Capsule Cycled Between 202 & 242°C*