

Solventless encapsulation of inorganic phase change materials

Invention Reference Number
202305359

The invention addresses the long-standing challenge of inorganic phase change materials use in building envelope and other applications by encapsulating them in a secondary sheath. This technology is highly useful for applications such as in reducing building heating cooling loads, refrigerators, ice chests, water supply pipe systems, battery and data center thermal management, vehicle cabin thermal management, and several other thermal energy storage applications.

Description

Inorganic phase change materials are highly desirable for thermal energy storage in buildings, as they store heat energy during the day by changing phase from solid to liquid. At night, they release energy when needed by changing phase from liquid to solid. However, a significant challenge arises when these materials leak from buildings or other structures while in their liquid state.

To address this issue, a strategy has been developed to encapsulate these phase change materials within secondary shells or coatings to prevent leakage. This process is achieved without using any solvents, which helps keep the overall manufacturing process cost-effective.

Benefits

- Scalability and adaptability: Highly scalable for production and easy to adapt for industry-scale production
- Superior control: Complete control over the composition of PCM core and polymer shell components, as well as shell and core thickness

Applications and Industries

- Heat management: Heat exchangers, data center thermal management, vehicle cabin thermal management, battery thermal management systems, household water heaters, refrigerators and high temperature fuel cells
- Medical applications: Transferring temperature-sensitive medicines, cells, and medical samples

Contact

To learn more about this technology, email partnerships@ornl.gov or call 865-574-1051.