



Solid-State Phase Change Technology for Use in Passive Solar Building Materials

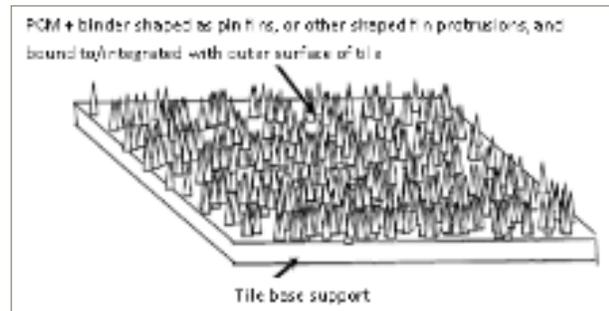
Passive solar systems have been used since the 1800s and include the use of sunrooms, light-reflecting window glazes, and shades over windows to block the summer sun. Once installed, passive solar systems will work without maintenance for decades. They can reduce overall heating and cooling costs, transfer energy demand to off-peak hours, and reduce temperature fluctuations. New buildings that install passive solar systems can install smaller HVAC systems to save significant amounts of money.

The use of phase change materials (PCMs) incorporated in trombe walls, ceilings, and floors are examples of such passive solar energy applications. PCM technology is much simpler to install than a sunroom or a solar water heater. PCMs absorb latent heat and change from solid to liquid, storing the energy. The energy is then released as surrounding temperatures cool down and the PCM solidifies again. Different PCM materials make the phase transition at different temperatures, allowing them to be used in a variety of settings, from attic insulation to wallboard. PCM building materials can be used in new structures or retrofits for low cost.

Researchers in the Department of Mechanical Engineering at Colorado State University have designed floor and ceiling tiles that use microencapsulated PCMs. The microcapsules contain the PCM as it changes from solid to liquid and back again. Prototype floor tiles incorporating PCMs have been found to reduce annual heating costs by an average of 24%.

Patent Information
Provisional patent application has been filed

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Features and Benefits

- Design allows both new structures and retrofits to use PCM technology
- Floor tiles incorporating PCMs reduce building heating costs by 24% or more
- PCMs on back side of tile do not affect aesthetics or strength

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