Thermal energy storage material based on 3D printed ceramic structures infiltrated with phase change materials

CSIC has developed a method to manufacture more efficient thermal energy storage materials by infiltrating highly porous 3D printed ceramic structures with phase change materials. This technology can be easily transferred to a mass production and the developed materials can be employed in technological applications linked to the storage and use of thermal energy.

Industrial partners from energy and/or additive manufacturing fields are being sought to collaborate through a patent licence agreement for the development of thermal energy storage materials.

An offer for Patent Licensing

3D thermal energy storage materials (3DTES)

Thermal energy storage (TES) systems stand out as an environmentally friendly technology that would enhance the efficient use and storage of solar energy and waste heat generated in industrial processes.

This patent allows developing 3D TES by combining a 3D printing process, using specific inks and patterned designs, and a subsequent phase change material (PCM) infiltration of the 3D structure.

3D TES avoids the liquid leakage of the molten PCM at high temperatures, are lightweight, mechanically and corrosion resistant, and exhibit an efficiency of the thermal energy storage up to 90%.

They can be employed in high temperature applications for thermal energy storage, such as in concentrated solar power plants, nuclear energy, recovery and reuse of waste heat from industrial processes, and aerospace.

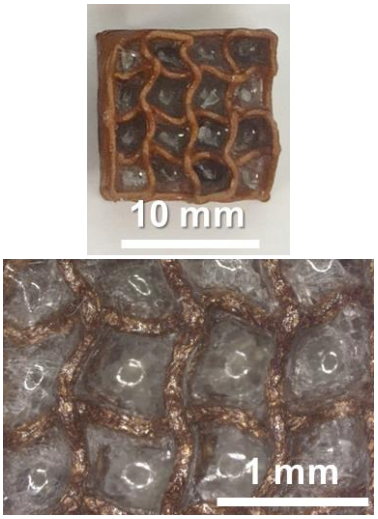

Image of 3D TES using a molten salt as PCM

Main innovations and advantages

- Development of highly porous 3D ceramic platforms using low cost feedstock with high chemical compatibility and thermal stability.
- 3D TES are easy to handle, self-supported, lightweight, and mechanically and corrosion resistant.
- Increment in the encapsulation capacity of the PCM (87%) and in the efficiency of the thermal energy storage (90%).
- Scalable process and widened to all kind of PCM, avoiding the liquid leakage in the molten state.
- For concentrated solar power applications, nuclear energy, recovery and reuse of waste heat from industrial processes, and aerospace.

Patent Status

Priority patent application with the possibility of international extension)

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