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# Low-Cost Reusable Thermal Energy Storage Particle for Concentrating Solar Power

**Authors :** Kyu Bum Han, Eunjin Jeon, Kimberly Watts, Brenda Payan Medina

**Abstract :** Gen3 Concentrating Solar Power (CSP) high-temperature thermal systems have the potential to lower the cost of a CSP system. When compared to the other systems (chloride salt blends and supercritical fluids), the particle transport system can avoid many of the issues associated with high fluid temperature systems at high temperature because of its ability to operate at ambient pressure with limited corrosion or thermal stability risk. Furthermore, identifying and demonstrating low-cost particles that have excellent optical properties and durability can significantly reduce the levelized cost of electricity (LCOE) of particle receivers. The currently available thermal transfer particle in the study and market is oxidized at about 700oC, which reduces its durability, generates particle loss by high friction loads, and causes the color change. To meet the CSP SunShot goal, the durability of particles must be improved by identifying particles that are less abrasive to other structural materials. Furthermore, the particles must be economically affordable and the solar absorptance of the particles must be increased while minimizing thermal emittance. We are studying a novel thermal transfer particle, which has low cost, high durability, and high solar absorptance at high temperatures. The particle minimizes thermal emittance and will be less abrasive to other structural materials. Additionally, the particle demonstrates reusability, which significantly lowers the LCOE. This study will contribute to two principal disciplines of energy science: materials synthesis and manufacturing. Developing this particle for thermal transfer will have a positive impact on the ceramic study and industry as well as the society.

**Keywords :** concentrating solar power, thermal energy storage, particle, reusability, economics
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