TechBriefs

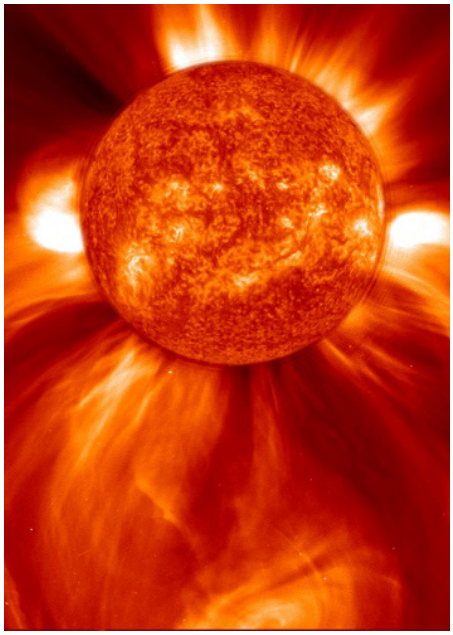
Savannah River National Laboratory

U.S. DEPARTMENT OF ENERGY • SAVANNAH RIVER SITE • AIKEN • SC srnl.doe.gov

At a glance

- Meets performance requirements
- Cost-efficient
- Resists extreme conditions
- Can be used to produce electricity in steam power plants and to heat & cool homes
- U. S. Patent 10,443,954 B1

High Performance Metal Hydride Based Thermal Energy Storage Systems for Solar Power



Researchers at the Savannah River National Laboratory (SRNL) have developed a method of combining the reversible formation of alloys at high temperature with the reversible formation of hydrides to store quality thermal heat.

Background

This invention makes use of the formation of alloys that occurs when a hydride system is dehydrogenated at high temperatures. The formation of alloys was considered to be a reversibility problem because of the need for high temperatures. This invention solves several problems that arise when dual metal hydride systems are used to store heat. Several hydrides are well suited for use to store heat, but they suffer from being corrosive and not able to generate enough pressure to hydrogenate low enthalpy hydride in the other side of the system.

A Better Alternative

Using a modified class of materials to meet performance and cost requirements, this invention solves many problems that accompany the use of hydrides to store thermal energy. Although alteration of enthalpy occurs when elements and metals are combined in hydrogenation and dehydrogenation reactions, the invention not only alters the enthalpy to store heat at the pressure and temperature required but also prevents corrosion and the evaporation of some metals when used at the high temperature necessary for high efficiency. This allows use of less expensive materials for the low enthalpy hydrides.

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SRNL-L1100-2017-00004
06.12.2020 13CC00025