

Heat storage system that helps mitigate global warming —World's first successful plant demonstration using calcium-based heat storage material—

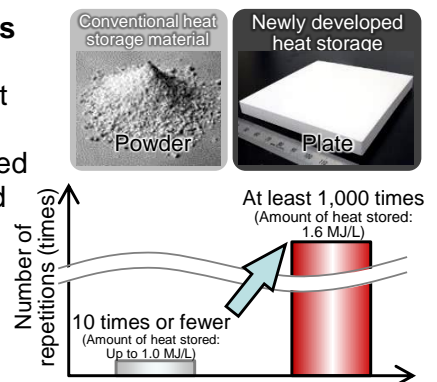
With the goal of reducing emissions of CO₂, a greenhouse gas, Aichi Steel Corporation (Headquarters: Tokai, Japan, President: Takahiro Fujioka), Toyota Central R&D Labs., Inc. (Headquarters: Nagakute, Japan, President: Noboru Kikuchi), and OMI MINING CO.,LTD. (Headquarters: Maibara, Japan, President: Ichiro Murakami) jointly developed a calcium-based heat storage material* that has the highest heat-storing density in the world and can be used repeatedly. Using this material, the companies installed the first heat storage system in the world that can utilize plant exhaust heat of 400°C or hotter, and demonstrated its functionality. It is estimated that this system will reduce CO₂ emissions by approximately 80% compared to systems that use steam obtained from a combustion-type boiler.

For this demonstration, Toyota Central R&D Labs conducted research on the base technologies, including the newly developed heat storage material, OMI MINING built the molding technology for the developed heat storage material, and Aichi Steel jointly designed the heat storage system and carried out the plant demonstration.

[Characteristics of the demonstration]

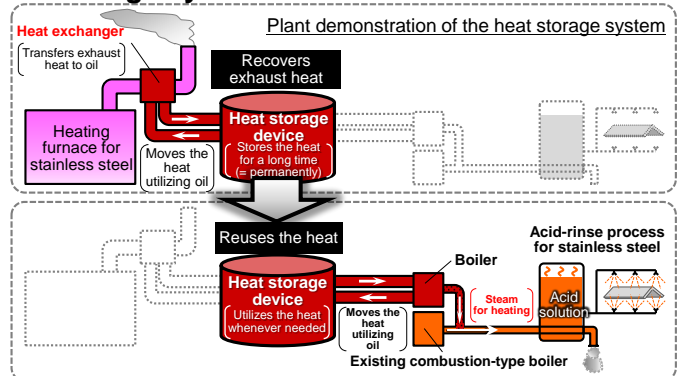
1. Developed a calcium-based heat storage material that has high heat-storing density and can be used repeatedly

We have developed a calcium-based heat storage material that has high heat-storing density and can be used repeatedly whenever needed. A small amount of clay mineral was dispersed in lime, the principal material, and the mixture was then molded and bound at high density, and formed into a plate shape. This technology has enabled the development of a heat storage material that can be used repeatedly over several thousand cycles while possessing high heat storage density, which is far superior to materials made using conventional technologies.



2. World's first plant demonstration of a heat storage system

We installed the world's first system that recovers exhaust heat of 400°C or hotter from a plant, stores it, and reuses it as heat whenever needed, inside the Kariya Plant of Aichi Steel. This system recovers the exhaust heat generated from a heating furnace for stainless steel and stores it in a heat-storing device. The stored heat is then utilized for generating steam to heat the acid solution in the acid-rinse process.



3. CO₂ emission reduction effect

Based on the demonstration, it is estimated that the new system will reduce CO₂ emissions by approximately 80% compared to systems in which steam obtained from a combustion-type boiler is used, and will also help reduce running costs.

4. Application of the heat storage system

In addition to effective utilization of exhaust heat from plants, the newly developed heat storage system can be expected to be utilized in a variety of fields, such as effective utilization of the heat associated with storage and transport of renewable energy from solar and wind power, as well as hydrogen.

Aichi Steel, Toyota Central R&D Labs., and OMI MINING plan to work on further improving the efficiency of the heat storage system and reducing its cost, deploying it commercially by 2030 with the goal of helping mitigate global warming by reducing CO₂ emissions.

* This heat storage material was developed based on the principle in which, when slaked lime (Ca(OH)₂) is heated to 400°C or higher, it stores heat by changing into quicklime (CaO) while emitting water. If water is added to the obtained quicklime (CaO), it reverts to slaked lime (Ca(OH)₂), and the heat generated during this process is effectively utilized. The chemical reactions can be expressed as follows: [For storing heat] Ca(OH)₂ + exhaust heat → CaO + H₂O; [For utilizing the heat] CaO + H₂O → Ca(OH)₂ + heat