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Innovations in Phase-Change Materials for High-Temperature Heat Storage

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Message from the Guest Editors

The amount of waste heat emitted from automobiles and industrial furnaces is immense. To recover and effectively utilize such waste heat, heat storage materials are indispensable. In addition to waste heat, thermal storage technology is also essential for Carnot batteries and solar thermal power generation.

Thermal storage technology can be classified into sensible heat storage, latent heat storage, and chemical heat storage, with latent heat storage technology attracting attention due to its high energy density and simple structure.

Various materials can be used for low- to medium-temperature (100–200 °C) heat storage, and practical applications are in progress. On the other hand, high-temperature heat above 500 °C has high potential for effective use as thermal energy, but there are many difficulties in integrating it with materials and capsules, and its practical application has not progressed. We particularly welcome papers on phase change materials, shell materials to hold PCMs, sealing technology for integration, and system applications, such as Carnot batteries, regenerative burner industrial furnaces, and solar thermal power generation using heat storage.

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Message from the Editor-in-Chief

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