



## **Special Feature: Advanced Thermal Management Technology for Developing the High-efficiency Vehicle**

### **Overview**

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Along with an increase in the proportion of electrically powered automobiles, the total amount of exhaust heat from vehicles themselves has decreased and the performance of each component is now approaching the theoretical limit. Thus, effective utilization of thermal energy, which thus far has been considered as a loss, has become a more important issue for developing high-efficiency vehicles. This special feature contains several articles that discuss thermal storage, heat conversion and temperature control towards effective utilization of thermal energy in motor vehicles.

The first three articles are related to exhaust heat recovery technologies for conventional vehicles. The first report focuses on a chemical thermal storage system designed for use at moderate temperatures. The second is a study on the downsizing of adsorbents in adsorption heat pumps as a temperature conversion technology for automotive air conditioning. The third paper reports a theoretical demonstration of high-performance thermoelectric materials designed using first-principles calculations.

The last three articles are focused on temperature control technologies. The fourth article is a study on the development of a novel thermal fatigue testing system based on a temperature control method that allows rapid but uniform temperature change. The fifth article describes basic research on a mechanism for improving the thermal conductivity of copper nanofluids for use as heat exchange media. The final article discusses pathways toward a radiative thermal management system with various functionalities.