NIMS and Tohoku University have jointly observed an anisotropic magneto-Peltier effect—a thermoelectric conversion phenomenon in which simple redirection of a charge current in a magnetic material induces heating and cooling. Thermoelectric heating and cooling are conventionally achieved by applying a charge current to a junction between two different electrical conductors. In this study, the researchers demonstrated a novel thermal control function using a single magnetic material without relying on a junction structure. Although the anisotropic magneto-Peltier effect is a fundamental thermoelectric conversion phenomenon, it has never before been observed.

Application of the anisotropic magneto-Peltier effect may enable thermoelectric temperature control of a magnetic material by simply redirecting a charge current in the material and creating a non-uniform magnetization configuration within it, rather than forming a junction between two different electrical conductors. In future studies, we will attempt to identify and develop magnetic materials that exhibit large anisotropic magneto-Peltier effects and apply them to the development of thermal management technologies that make electronic devices energy-efficient.

More information: Ken-ichi Uchida et al.

Provided by National Institute for Materials Science


This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.