



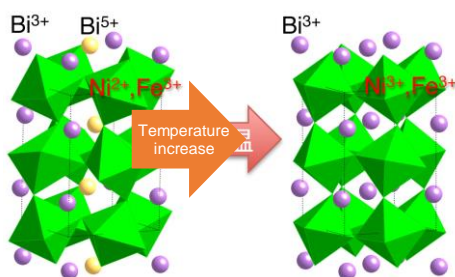
September 21, 2018

## JMTC enters joint research agreement with Tokyo Institute of Technology for negative thermal expansion compound

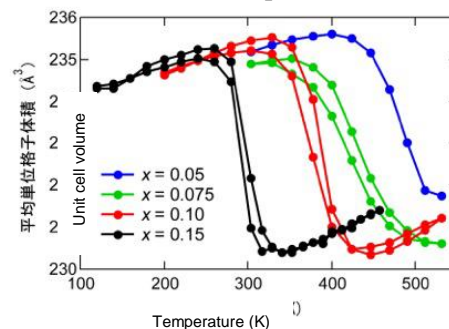
Japan Material Technologies Corporation (JMTC; Head office: Chuo-ku, Tokyo; CEO: Koyu Urata) is pleased to announce that JMTC has entered into an agreement with Tokyo Institute of Technology (Tokyo Tech) and Kanagawa Institute of Industrial Science and Technology regarding joint research on a negative thermal expansion compound.

The negative thermal expansion compound of the agreement (“Material”) is oxide material  $\text{BiNi}_{1-x}\text{Fe}_x\text{O}_3$  (bismuth · nickel · iron oxide) that shows negative thermal expansion four to five times higher than that of commercially available materials when near room temperature. It was discovered during research by Professor Masaki Azuma and associates of the Frontier Research Center at the Institute of Innovative Research of Tokyo Tech. The Material is an oxide with a perovskite structure and exhibits a negative linear coefficient of thermal expansion of 187 millionths per degree of temperature rise in the temperature range near room temperature. The temperature range in which negative thermal expansion occurs can also be controlled by altering the amount of iron replacing nickel in the material.

<Crystal structure of the material>



<Change in  $\text{BiNi}_{1-x}\text{Fe}_x\text{O}_3$  volume at different temperatures>



Negative thermal expansion compounds are used in processes that require precise positioning, such as in optical telecommunications and in semiconductor manufacturing equipment, to cancel out thermal expansion of structural materials. The Material, which has greater negative thermal expansion properties than existing materials, is expected to be applied in areas that require higher levels of thermal expansion control where existing negative thermal expansion compounds have been inadequate to solve problems.

JMTC, which registered as a member of Industry Liaison Membership System (Class I) at Tokyo Tech in March 2018, is working on commercializing materials-related technologies developed by Tokyo Tech. The Material will be JMTC’s first commercialization project for technology developed by Tokyo Tech.

JMTC is a startup company specializing in the field of materials chemistry. The company is focused on the use of licensing agreements and carve-outs to commercialize innovative technology developed mainly by Japanese corporations, as well as universities, research institutions, and other organizations. The company is committed to making a contribution towards the creation of innovation by promoting commercialization of unutilized technology that have been developed within universities.