

October 4, 2022

Japan Material Technologies Corporation

JMTC's BNFO product development project has been selected for the METI grant

~Promoting development of negative thermal expansion materials
essential for innovative thermal management~

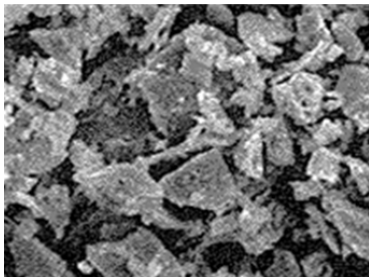
Japan Material Technologies Corporation (Head Office: Chuo-ku, Tokyo; President: Koyu Urata; "JMTC") has been selected by the Ministry of Economy, Trade and Industry (METI) for the "2022 Research and Development Support Program for Growth-oriented Small and Medium Enterprises (Go-Tech Program)" ("the Program"), jointly applied for with Kanagawa Industrial Technology Research Institute (KISTEC) and Tokyo Institute of Technology (Tokyo Tech).

The Program supports research and development of small and medium-sized enterprises (SMEs) that are conducted in collaboration with universities and public research institutes, etc. as well as efforts for commercialization of such R&D, aiming to advance basic manufacturing technologies and services. The consortium including JMTC applied and was selected for the Program for the "Development of Negative Thermal Expansion Materials Essential for Innovative Thermal Management in the Next-Generation Semiconductor Industry". This will help the development of BNFO, a negative thermal expansion material handled by JMTC.

While many materials exhibit positive thermal expansion (thermal expansion), BNFO ($\text{BiNi}_{1-x}\text{Fe}_x\text{O}_3$ (bismuth-nickel-iron oxide)) is a material that exhibits enormous negative thermal expansion (thermal contraction) of 187 parts per million per degree of temperature rise in the phase transition temperature range. This material was invented by Professor Masaki Azuma and his colleagues at the Tokyo Tech, and JMTC has been developing an industrial manufacturing process for BNFO under a joint research agreement with Tokyo Tech and KISTEC.

Thermal management is a major issue in the semiconductor mounting process, as semiconductors become more powerful and compact. There have been many developments in terms of improving heat dissipation and lowering thermal expansion. With this grant, JMTC will work on mass production, application development and lineup expansion of BNFO in order to accelerate developments to offset thermal expansion using innovative materials.

<Electron micrograph of BNFO>



<Sample of BNFO>



JMTC works on the commercialization of innovative technologies developed by Japanese companies, universities, and research institutes through license-outs and carve-outs. JMTC will continue efforts to enhance the functionality of inorganic materials and promote the commercialization of underutilized technologies, eventually contributing to innovations in the energy and electronics fields.