



Contribution ID: 1154

Type: **Poster Presentation**

Tue-Mo-Po2.05-05 [28]: Tensile properties of DyBaCuO low porosity bulk material melt-processed in oxygen atmosphere

Tuesday 24 September 2019 08:45 (2 hours)

It is well-known that REBaCuO, where RE denotes rare-earth elements, superconducting bulk materials can trap large magnetic field in the compact space. Since REBaCuO bulk materials are subjected to electromagnetic force, improvements of the mechanical properties of REBaCuO bulk materials are indispensable for the development of high-performance devices. However, conventional REBaCuO bulk materials melt-processed in air contain pores. Pores cause degradation of the mechanical properties due to the reduction of net cross-sectional area and stress concentration around pores. In this study, the mechanical properties of a DyBaCuO low porosity bulk material melt-processed in oxygen atmosphere were evaluated. DyBaCuO bulk materials melt-processed in 50 and 75% oxygen atmosphere were also evaluated for comparison. The porosity was decreased by the increase of oxygen pressure, and few pores were observed for the bulk material melt-processed in oxygen atmosphere. The mechanical properties were evaluated through tensile tests for specimens cut from the DyBaCuO bulk materials. The mechanical properties of REBaCuO bulk materials are commonly evaluated through bending tests for specimens cut from bulk materials. However, the strength values evaluated through the bending tests are overestimated due to the limited maximum stress region in the bending test specimen. The tensile test specimens were glued to metal rods, and the tensile load was applied through the universal joints. The tensile strength was improved by the decrease of the porosity. The tensile strength values obtained in this study were lower than bending strength values reported elsewhere. Flow like patterns formed by the crack propagations were observed on the fracture surfaces of the specimens. Through the observations on the fracture surfaces, the fracture mechanisms are discussed both for the porous and the low porosity bulk materials.

Primary authors: Dr IWAMOTO, Akifumi (National Institute for Fusion Science); Dr MURAKAMI, Akira (National Institute of Technology, Ichinoseki College); Prof. YAMAMOTO, Akira (High Energy Accelerator Research Organization (JP))

Presenter: Prof. YAMAMOTO, Akira (High Energy Accelerator Research Organization (JP))

Session Classification: Tue-Mo-Po2.05 - Mechanical Behavior I