

## **MECHANICAL BEHAVIOR AND SUPERCONDUCTING PROPERTIES OF NANOSIZE MgO ADDED DIP-COATED Bi<sub>2</sub>Sr<sub>2</sub>CaCu<sub>2</sub>O<sub>8</sub> SUPERCONDUCTING TAPE**

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### **ABSTRACT**

In this study, 3 to 8 weight percent of nanosize MgO particles was added to Bi<sub>2</sub>Sr<sub>2</sub>CaCu<sub>2</sub>O<sub>8</sub> (Bi-2212) high-temperature superconductor to fabricate Bi-2212 superconductor elements with superior mechanical properties. The mechanical strength of the samples was studied by conducting the compression test at room temperature, and the addition of 5% nanosize MgO particles produced the highest strength when compared with other samples. The sample with 5wt% MgO addition also exhibited superior superconducting properties. The Bi-2212 powder with 5% nanosize MgO addition was used to fabricate Bi-2212 tapes through the dip-coating then stacking method. The fully processed tapes were investigated via dc electrical resistance measurements, XRD patterns, SEM micrographs, transport critical current density and tensile tests. The tensile tests were conducted at room and 77 K. Results of tensile tests and Young's modulus for the tapes showed that the Bi-2212 tapes with nanosize MgO addition recorded better mechanical property when compared to the non-added samples both at room and 77 K. The double-core tape with 5% MgO addition recorded the highest failure point at 160 MPa. Beside the strengthening effect that was observed in the nanosize MgO added Bi-2212 superconductor tapes, superior superconducting properties were also observed in the tapes.

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