

FABRICATION OF MgO FIBERS AND THE MECHANICAL PROPERTIES OF MgO FIBERS ADDED Bi-2212 SUPERCONDUCTOR COMPOUNDS

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ABSTRACT

MgO fibers have been fabricated in-house using the sol-gel route. In the process, magnesium turnings were added with methanol to produce magnesium methoxide. Ethylene glycol was then added to the mixture and stirred continuously to form the desired gels. The gels were extruded and heat treated to produce the cylindrical shape MgO fibers. Small weight percentage of 3% to 8% MgO fibers were added to Bi₂Sr₂CaCu₂O₈ (Bi-2212) superconductor powder. The Bi-2212/MgO fibers compounds were palletized and heat treated through partial- melt process, followed by slow cooling. The samples were characterized by x-ray diffraction patterns (XRD), emission scanning electron microscopy (FESEM) with energy dispersive x-ray (EDAX), and dc electrical resistance measurements at zero magnetic fields. Compression tests were conducted to study the mechanical behavior of the samples. From the characterization results, additions of small amount of MgO fibers improved the texture of the Bi-2212/MgO fibers compounds. Significantly higher stiffness, strength and toughness were observed in the compounds with 5% MgO fibers addition.

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