**Strong Enhancement of Critical Current Density in MgB2 Bulk and Ni-Sheathed Tapes With Very Small Dy2O3 Additions**

**ABSTRACT**

A series of polycrystalline samples were prepared by in situ reaction of Dy2O3 (0.5-5.0 wt.%) with Mg + B. While the superconducting transition temperature, Tc remained largely unchanged, the intragrain distribution of nano precipitates of DyB4 and MgO led to strong enhancement in critical current density, Jc at lower field below 4 T. The best sample (with only 0.5 wt.% Dy2O3 additions) had a Jc (1 T) of around a factor of 4 higher compared to the pure sample at 6 K and 20 K indicating improved connectivity and pinning. On the other hand, ex situ Ni-sheathed tapes fabricated from the Dy2O3 added powders exhibited critical current, Ic (4.2 K) superior to those made from pure MgB2 powders at higher field above 3 T. The former also showed lower anisotropy in Ic with respect to field direction.

**Keyword:** Critical current density, Dy2O3 additions, pinning.