

## Enhanced critical current density in MgB<sub>2</sub> with Dy<sub>2</sub>O<sub>3</sub> particle additions.

### ABSTRACT

This paper reports on the effect of oxide particle Dy<sub>2</sub>O<sub>3</sub> additions on the superconducting properties of MgB<sub>2</sub>. The polycrystalline samples were prepared by well mixing magnesium and boron elemental powders, followed by heat treatment for in situ reaction in inert gas environment. All the samples showed MgB<sub>2</sub> as the main phase with MgO and DyB<sub>4</sub> as impurities. Magnetization measurements showed that the superconducting transition temperature, T<sub>c</sub> remained largely unchanged (37.5 – 38K) even for Dy<sub>2</sub>O<sub>3</sub> additions up to 15.0 wt.%. However, the transition curve was broadened in samples with larger amount of additions. The best sample with only 0.5 wt.% Dy<sub>2</sub>O<sub>3</sub> additions had a J<sub>c</sub> of around a factor of 4 higher compared to the pure sample at 6K(1T). Tem imaging showed the distribution of nano precipitates of DyB<sub>4</sub> and MgO within the grain which may improve the pinning leading to enhancement in critical current density, J<sub>c</sub>.

**Keyword:** MgB<sub>2</sub>; Critical current density; Nano precipitates.