

Improved Superconducting Properties of MgB₂ Bulk by Mechanical Milling of Boron Powder

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Semi-crystalline boron powder was ball-milled at 200 rpm for 0-15 h using toluene as a medium. The ball-milled boron powder was then dried in a vacuum oven at 100°C. The aims were to achieve an amorphous phase and to decrease the particle size of the boron powder. The ball-milled boron powder was mixed with magnesium powder in a stoichiometric composition of MgB₂ and pressed into pellets. The pellets were heat-treated at 900°C for 30 min in flowing Ar atmosphere. The experimental results showed that the MgB₂ sample prepared using the 7 h ball-milled boron powder has the highest critical current density, J_c . The J_c (H) properties and the critical temperature, T_c as a function of the ball milling time of the boron powder were presented and discussed.

Keywords : MgB₂, ball milling, critical current density