Milling Effect of *Ex-situ* MgB_2 Bulk Prepared Using Mechanically Milled and Glycerin Treated Boron Powder

Yi-Jeong Kim, Byung-Hyuk Jun, Chan-Joong Kim
Neutron Science Division, Korea Atomic Energy Research Institute (KAERI), Daejeon 305-353, Korea

The density for the MgB_2 core after its formation by the *in-situ* method is rather low with porous microstructure as compared to the *ex- situ* method. Mechanical milling has been proved to be an effective technique for reducing particle size, resulting in a smaller grain size, a better reactivity, and an enhancement of the superconducting properties of MgB_2. In this work, the milling effect of *ex-situ* MgB_2 bulk prepared using mechanical milled and glycerin treated boron powder was studied. Mechanically milled and glycerin-treated boron powder was mixed with magnesium powder in a stoichiometric composition of MgB_2 and pressed into pellets. The pellet was heat-treated at 900℃ for 30 min in flowing Ar gas. The *ex-situ* MgB_2 bulks were crushed in a mortar and then ground into fine powder by dry ball milling using ZrO_2 balls for 1 and 10 hours at 200 and 400 rpm. Even when the *ex-situ* MgB_2 bulks were just crushed, the T_c and J_c values of the *ex-situ* MgB_2 sample deteriorated. With increasing of milling time and speed for *ex-situ* MgB_2 bulk, the T_c and J_c values were gradually decreased.

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