

## High Energy Milled Ex situ MgB<sub>2</sub> for Tapes and Wires



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## HIGH ENERGY MILLED EX SITU MGB<sub>2</sub> FOR TAPES AND WIRES



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Cuvillier Verlag Mai 2011, 2011. Taschenbuch. Book Condition: Neu. 211x147x12 mm. Neuware - 1. The optimum solution for the difficulties during conductor deformation was to use the ex situ precursor powder which is not sensitive to heat treatments in the range of temperatures needed for the working stress release of the sheath metal. Two different ex situ powders are studied: homemade ex situ (based on mechanically alloyed in situ powder) and commercial powder with reduced crystallite size achieved by high energy ball milling. 2. As the first approach, ex situ powder is prepared using mechanical alloying. A detailed phase analysis shown secondary phases, such as MgO and MgB<sub>4+x</sub>. A high critical current density for unsintered tapes and wires was obtained. It is observed that none of the applied final heat treatments of the conductors improve their superconducting properties. It is assumed that, heat treatments influence the crystallite size which is explained by MgO at the grain boundaries blocking grain growth. Additional milling or chemical treatment of the powder to clean the grains is needed to accomplish a smaller particle size. However, if medium J<sub>c</sub> values are sufficient, the MA in-ex situ powder is an interesting precursor powder for conductors needed for the react & wind method of superconducting coil preparation, because the final heat treatment of a such a conductor is not needed. 3. As the second approach, commercially available ex situ powder was milled to reduce grain size. The average crystallite size of the powder is reduced by ball milling drastically from 47 nm to 15 nm, however, this powder is highly reactive. Powders after 2 h or longer milling times exposed to air react rapidly with oxygen and create up to 40 wt% of secondary phases, like MgB<sub>4+x</sub> and MgO. This reaction can be avoided by using exclusively...



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