

Mass Production of Single Grain YBCO Bulk Superconductors with a Large Levitation Force

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Single grain YBCO bulk superconductors are used as a contactless bearing of a superconducting flywheel energy storage system due to the large levitation force against a permanent magnet. To achieve a large levitation force, it is necessary to increase the grain size and a high critical current density (J_c) of a Y123 superconductor. To do this, processing parameters regarding the growth of a single Y123 grain should be carefully controlled to be optimized. This work is aimed to understand the possibility of simultaneous growth of many YBCO bulks as a batch process for the commercial manufacture of YBCO superconductors. The effect of thermal instability on the Y123 growth and the oxide coating to suppress the growth of subsidiary Y123 grains with undesirable growth orientations are reported. The superconducting properties of YBCO bulk superconductors are also reported in terms of a levitation force and trapped magnetic field at 77K.

Keywords: Mass production, single grain YBCO bulk, levitation force