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Physical properties of all c-grown Gd123 bulks starting from various metal compositions

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REBa₂Cu₃O_{*y*}(RE123, RE: rare earth element) melt-textured bulks are used as superconducting magnets using their high field trapping (*B*_T) properties. Their *B*_T performances are enhanced by both enhancement of critical current density (*J*_c) and an increase in size of the bulks. We prepared all *c*-grown Gd123 melt-textured bulks grown on a Eu123 melt-textured bulk as a seed plate using newly developed Single-Direction Melt Growth (SDMG) method. This method is particularly unique in that RE123 melt-textured bulks are grown only vertically from the seed plate cut from the large RE123 melt-textured bulks having higher peritectic temperatures. Therefore, melt growth proceeds in one direction on a large bulk plate, which enables both flexibility in shapes and short-time fabrication of large bulks. In this study, improvement of *B*_T properties by control of starting metal composition and additions of pre-sintering or pre-melting process prior to the melt-growth was attempted. *J*_c-*B* properties of small pieces cut from bulks starting from Ba-rich compositions (Gd : Ba : Cu = 1.25 : 1.75+x : 2.5 (Gd123 : Gd211 = 7.5 : 2.5), $x > 0$) were improved compared with standard Gd123 bulks with $x = 0$, suggesting that RE/Ba substitution was suppressed by excess Ba compositions. In addition, introduction of the pre-melting process (1055℃ in air) was more effective to achieve high *J*_c rather than introduction of pre-sintering process (960℃ in air). Improved *B*_T distributions of Gd123 bulks grown by SDMG method will be also shown.

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