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## Performance of two-ply four-filaments Gd123 tape coil

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We have succeeded in the development of the 25T cryogen-free superconducting magnet recently [1]. As a next step, a development of 30 T class superconducting magnet is planned. In order to realize high field superconducting magnets beyond 30 T, the reliability of REBa<sub>2</sub>Cu<sub>3</sub>O<sub>y</sub> (RE123, RE: Y and rare earth) conductors should be improved. For this purpose, we made single pancake coils by co-winding two-ply (two-stacked) RE123 tapes as an R&D study. The tape used in this study is a four-filaments Gd123 tape, whose Gd123 layer was divided by a scratch on the IBAD-MgO layer [2]. Two of the four-filaments Gd123 tapes were wound together with a polyimide tape insulation, so that the Gd123 sides of two tapes are face-to-face without the insulation. Finally, the Gd123 single pancake coil was impregnated by epoxy. The inner and the outer diameters of the Gd123 single pancake coil are 50 mm and 92.5 mm, respectively. The critical currents and n-values of the two-ply Gd123 tape coil at 77.3 K are 206.9 A and 15.2 for the inside-winding and 207.6 A and 15.0 for the outside-winding. The detailed coil performance will be presented and be compared to the two-ply mono-filament Gd123 coil.

[1] S. Awaji et al., Supercond. Sci. Technol. submitted. [2] S. Fujita et al., IEEE TAS 27 (2017) 6600504.

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