

***Fabrication of 4 T HTS Magnet for
Adiabatic Demagnetization Refrigerator
(ADR)***

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A high temperature superconducting (HTS) solenoid is fabricated to provide time-varying magnetic field for adiabatic demagnetization refrigerator (ADR). The fabricated magnet has the outer diameter of 88 mm, the inner diameter of 24 mm, and the height of 54 mm. The magnet is designed to operate in a ramping mode with the maximum field of 4 T, and to be conductively cooled by a 4 K Gifford-McMahon cryocooler. Since the changing current operation of the superconducting magnet involves inevitable energy dissipation and the temperature increase of HTS the tape, the copper thermal drains are inserted into every layers of the magnet winding. A thermal analysis is conducted to confirm the effectiveness of the thermal drain and to predict the transient temperature variation of the conductor inside the winding pack. The time-varying AC loss of the HTS magnet is calculated by using T-A formulation which is based on the calculation of the current vector potential T and the magnetic vector potential A. According to the results of thermal analysis, the operation scenario of the magnet is appropriately proposed. The detailed design and the fabrication process are presented in this paper.