Cryocooler-free Superconducting Magnet System Using High-temperature Superconducting Wire Based on Rare Earth Barium Copper Oxide

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RTRI is studying the application of a Rare Earth (RE) high-temperature superconducting wire to a superconducting magnet as one of research studies for superconducting MAGLEV. The greatest feature of a high-temperature superconducting magnet is usable at high temperature than conventional low-temperature superconducting magnet. Above all, an RE wire, which has superior characteristic in a high magnetic field, is suitable for coil applications. To confirm the applicability of an RE wire, we developed the cryocooler free High-temperature superconducting magnet using RE wires of about one quarter of the size of a real machine. This magnet can generate a magnetic field stronger than 1 T at a coil temperature of 50 K, and has a cold insulation performance that is able to keep a coil temperature lower than 50 K more than eight hours after initial cooling.