
Contribution ID: **491** Contribution code: **THU-PO3-710-10** Type: **Poster**

# Thermal-Quench Behavior of GdBCO Coils Wound with Grease Containing Various Fillers as Insulation Materials

*Thursday, 18 November 2021 10:00 (20 minutes)*

Recently, we proposed a novel winding technique, which entails employing grease materials as a turn-to-turn insulator to ameliorate the charging-discharging delay observed in no-insulation (NI) coils. As a result, we obtained coils that possess superior thermal and electrical stabilities without charging-discharging delays. However, because of the higher resistance of these grease materials as compared with HTS tape, the turn-to-turn resistance is high, which results in a small amount of current bypassing between the layers of the coil. Therefore, adding thermally and electrically conductive fillers to the grease could be an effective way to improve its properties. In this study, the quenching and recovery behavior of a GdBCO coil wound with grease that contains various fillers such as BN, CNTs, and Ag was examined with respect to the Joule heat energy induced by a local hotspot. Based on the experimental results, the minimum quench energy (MQE) and normal zone propagation velocity (NZPV) of the coil were investigated. Furthermore, the feasibility of the proposed winding technique for the development of the GdBCO coil with extremely high thermal stability is discussed in detail.

<Acknowledgement>
This work was supported by the Korea Basic Science Institute under Grant D110200

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**Session Classification:** THU-PO3-710 Stability