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M1Po3A-02: Investigation of Leakage in Bi-2212 Rutherford Cables

Monday 19 May 2025 14:00 (2 hours)

Bi-2212 round wire is the only viable HTS superconductor to produce high-field magnets. It can be fabricated in a variety of multifilamentary architectures, and it can be fabricated into Rutherford and six-on-one cables. Rutherford cabling degrades JE of the round Bi-2212 wire, and the isostatic overpressure heat treatment (OPHT) used for Bi-2212 distorts the shape of the wires. Single strands of Bi-2212 have been rolled and OPHTed simulating the deformation that occurs during Rutherford cabling plus OPHT. The JE decreased up to ˜18 % in rolled wire with this decrease saturating at about ˜20% thickness reduction. The layers in a Rutherford cable coil must be insulated from one another so the wires do not bond together during OPHT at 890 ⊠C, and this same insulation must prevent the layers of Rutherford cable from shorting together at cryogenic temperature. In the past, braided alumino-silicate fiber was used for the insulation, but it often chemically reacted with the Bi-2212 wire during OPHT causing the wire to leak, further degrading JE. Recently, the alumino-silicate has been replaced with braided pure alumina fiber that does not chemically react with the Bi-2212. Surprisingly some Rutherford cable coils with pure alumina braid leaked after OPHT. The reason why these Rutherford cables leaked is being investigated. The presentation will report our finding on the causes of the Rutherford cable leakage and how to eliminate this leakage.

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