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Fri-Mo-Or25-04: Fabrication and test of Bi-2212 Canted-Cosine-Theta coils

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Future accelerator magnets for producing 20 T and beyond will require using high temperature superconductors (HTS) in combination with low temperature superconductors (LTS). Under the U.S. Magnet development Program (US-MDP), LBNL is exploring the possibility of fabricating HTS insert dipoles based on Bi-2212 conductors, using the Canted-Cosine-Theta (CCT) technology, in order to increase the field of Nb3Sn outsert dipoles and reach 20 T in the bore. In order to address the technology challenges of this type of magnets, a Bi-2212 CCT prototype magnet, called BIN4, and two Bi-2212 CCT coils, called BIN5a and BIN5b, have been fabricated and tested. In a previous work, the main issues encountered during the winding process of the coils and the pre-oxidation cycle of the mandrels, together with the solutions we adopted, were presented. This work reports on the final stage of the fabrication process, including heat treatment, impregnation and instrumentation, and the test results. Additionally, the mechanical analysis and progresses towards testing another Bi-2212 CCT insert dipole, called BIN5c, in a background field of 8.5 T, is presented. The background field is produced by CCT5, a 90 mm bore Nb3Sn magnet fabricated at LBNL. Finally, the progress of technology development towards fabricating a 0.8 m long Bi-2212 CCT magnet that produces 5 T in the bore is investigated.

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