

Critical Properties of HTS Beyond J_c to Become THE Material for High-Field Magnets

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Abstract—High temperature superconductors are offering huge potential due to the critical surface for high field magnets. When talking about 20 T+ compact fusion magnets, accelerator magnets or simply user magnets, HTS are the future. But how to assure the future? What needs to be done by us, the community, to realize THE conductor for high field magnets? Is the conductor architecture of the current state-of-the-art BSCCO-2223, BSCCO-2212 and ReBCO ideal? Can we work on the architecture of those conductors to adjust those for high field magnets needs? What about quench protection, detection, can we improve the conductor design to mitigate that problem? What about mechanical properties, are those sufficient to withstand Lorentz forces present in the different types of magnets?

Companies and research centers invest a lot in improving the critical current of the conductors, especially in the case of ReBCO material. But there is much more need of working on increasing normal zone propagation velocity and increasing delamination and shear tolerance in a case of ReBCO. Concerning Bi-2212 simplifying challengeable heat treatment is a route for conductor to succeed.

In this talk I will give an overview of outstanding developments of HTS materials, absolutely necessary to make HTS THE conductor for the future high field magnets. I will try to convince the community to invest in improving properties such as mechanical properties and normal zone propagation velocity instead of rising critical current density.

Keywords (Index Terms)—Coated Conductors, REBa₂Cu₃O₇, Bi-2212 (1), Bi-2223, Bi HTS, Normal Zone Propagation Velocity, Mechanical Properties (not seen on the list)