

High field HTS insert coils : Status and key technical issue

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The discoveries of high temperature superconductors received great attention due to their high critical temperatures. These materials also exhibit extremely high critical magnetic fields and high critical current density at low temperature, high magnetic field. Thus, they are the most promising materials for superconducting magnets above 20 T.

In this talk, progress in the development of HTS materials and insert coils at the National High Magnetic Field Laboratory will be reviewed. In 1999, a Bi-2212 stack of double pancakes generated 3 T in a 19 T background field. These results will be reviewed in terms of implications for future systems. Individual double pancakes of Bi-2223 have also been tested and their performance will also be discussed. The present goal of a 5T system will be presented and the key technical requirements for larger, higher field systems will be addressed.

It will be shown that in addition to increased critical current density, improved mechanical performance (strain resistanced) is necessary for high field systems. Furthermore, improvements in the conductor n-value will improve prospects for operational systems.