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Recent progress on the development of high performance Bi-2212 wires and coils

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Bi-2212 round wire made by powder-in-tube technique has emerged as a very promising conductor for high field NMR and accelerator magnets because it is can be made in multiple multifilament architectures and in the twisted state that benefits low hysteretic losses, isotropic properties, and high magnetic field quality. Bi-2212 powder is now available from two US companies, MetaMateria and nGimat. Bruker-OST is routinely producing Bi-2212 wires in multiple architectures and kilometer pieces. We are investigating Bi-2212 powders made by MetaMateria and nGimat, and are doing overpressure heat treatments (OP-HT) on wires made from these powders by Bruker-OST. We have studied the effects of twisting, Rutherford cabling, and heat treatment condition on the superconducting properties and microstructure of the recent wires. Critical current density of Bi-2212 wire has been improved significantly. Short samples of wire made with nGimat powder have JC(4.2K, 15T) = 6860 A/mm2 (4.2 K, 5 T) and JE(4.2K, 15T) = 1360 A/mm2 with overpressure processing. These wires are now going into significant coils and much of the focus is now shifting to ensuring that such good properties can be maintained in useful coil forms. Recent progress will be described.

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