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M2Po2E-04 [52]: Strong round Bi2212 wire and its fabrication into transposed high current cables

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Reinforced round Bi2212-based, high temperature superconducting wires and transposed cables are being developed for use in coils that are problematic with wide HTS tapes, and that need to operate beyond the limits of low temperature superconductors. This paper describes advances in the development of our strong round HTS 2212 wire, scale up to production lengths and fabrication into transposed Rutherford cable architectures. For wire strengthening, high modulus strips are helically wrapped and diffusion bonded onto the 2212/Ag round wires, with relatively long pitch lengths and narrow gaps between the strips that allow oxygen exchange with the atmosphere as required to form high J_c 2212 by subsequent melt texturing reaction. Wires can be produced to required, specific levels of strengthening without adding excessive amounts of reinforcement that reduce effective current density, while meeting the tensile stress and radial compression requirements of some applications, for example exceeding 150 MPa in radial compression and 300 MPa in axial tension. Current densities of these wires also meet the requirements of some applications even when processed by 1 atm melt texturing, and a wider range of applications when processed by the over pressure process pioneered at The Applied Superconductivity Center / Florida State University. Scale up to enable production is under way to enable longer test length production of these kinds of wire, that is now enabling cable and coil developments

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