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Improving critical current in ternary APC Nb3Sn superconductors by using internal oxidation method

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Internal oxidation technique could generate nano oxide particles in Nb3Sn strands, which could significantly refine the Nb3Sn grain size and boost the high-field critical current density. . In this paper, we will report the recent progress of the APC (Artificial Pinning Center) Nb3Sn wire in Hyper Tech. Our APC Nb3Sn wires with Ta and either Zr or Hf doping demonstrated substantial grain refinement and significantly increased Jc,nonCu, while retaining the high Bc2 values of the best ternary Nb3Sn conductors. The non-Cu Jcs of these APC conductors has surpassed the best state-of-the-art Nb3Sn and the Jc,non-Cu specification of the Future Circular Collider (FCC). Their Bc2 was about 28 T, about 1-2 T higher than present state-of-the-art conductors. This strand has been made to 217-filament restack strands getting filament size of 35 micros at the 0.7 mm strand.

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