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## **M1Or3F-01: Developing Advanced Nb<sub>3</sub>Sn conductors in Hyper Tech**

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In this paper we will report the recent progress of making ternary APC (Artificial Pinning Center) Nb<sub>3</sub>Sn conductor using internal oxidation technique in Hyper Tech. Our ternary APC Nb<sub>3</sub>Sn conductors with Ta and either Zr or Hf doping demonstrated substantial grain refinement and significantly increased J<sub>c,nonCu</sub>, while retaining the high B<sub>c2</sub> values of the best ternary Nb<sub>3</sub>Sn conductors. The non-Cu J<sub>c</sub>s of these ternary APC conductors have surpassed the best state-of-the-art Nb<sub>3</sub>Sn and the J<sub>c,non-Cu</sub> specification of the Future Circular Collider (FCC). Their B<sub>c2</sub> was about 28 T, about 1-2 T higher than present state-of-the-art conductors. This APC strand has been made to 217-filament restack strands getting filament size of 35 microns at the 0.7 mm strand. These newly developed APC wires have RRR above 150 while surpassing the J<sub>c,non-Cu</sub> specification of the FCC.

We will also report the progress in increasing the specific heat (C<sub>p</sub>) of the Nb<sub>3</sub>Sn conductors to increase the energy margin against quenching by adding certain high C<sub>p</sub> material in the strands. We successfully made 217-filament restack strands with filament size of 35 microns at the 0.7 mm strand and demonstrated the higher specific heat strands has much higher Minimum Quench Energy (MQE) values while keeping its high J<sub>c</sub> and high RRR.

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