



Contribution ID: 442

Type: **Invited Oral**

M2Or3I-03: [Invited] Nb₃Sn conductors with artificial pinning centers for high field accelerator magnets

Tuesday 11 July 2023 17:15 (30 minutes)

The record J_c of commercial Nb₃Sn conductors has been at a plateau since the early 2000s; however, much higher J_c than the state of the art is required for building the high-field accelerator magnets in future energy-frontier circular colliders. In the past few years a new type of Nb₃Sn conductor with artificial pinning centers (APC) based on the internal oxidation method has demonstrated significantly superior performance relative to the state of the art. In 2019 the APC conductors we developed first reached the non-Cu J_c specification required by the 16 T dipole magnets for the proposed Future Circular Collider (FCC)-hh. Since then our efforts have been mainly focused on pushing the APC strands toward readiness for practical applications, and great progress has been made. It was also found that this method not only significantly improves non-Cu J_c at high fields (e.g., above 10 T), but also dramatically reduces persistent-current magnetization at low fields (e.g., below 3 T) relative to the restacked-rod-process (RRP®) conductors due to the point pinning behavior. In this talk the opportunities, challenges, current status and future plans for the APC Nb₃Sn conductors will be discussed.

Author: XU, Xingchen (Fermi National Accelerator Lab)

Co-authors: WAN, Fang (Fermi National Accelerator Lab); ROCHESTER, Jacob (The Ohio State University); SUMPTION, Mike (The Ohio State University); Dr PENG, Xuan (Hyper Tech Research Inc.)

Presenter: XU, Xingchen (Fermi National Accelerator Lab)

Session Classification: M2Or3I: Special Session: High Field Superconducting Materials for Accelerator Magnets I