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Nb₃Sn superconductors with artificial pinning centers for high-field accelerator magnets

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Nb₃Sn will be a workhorse superconductor for building high-field accelerator magnets (dipoles, quadrupoles) for future energy-frontier circular colliders, but the performance of the state-of-the-art Nb₃Sn conductors is still insufficient for this application. In the past few years a new type of Nb₃Sn conductor with artificial pinning centers (APC) based on the internal oxidation method has been developed, and has demonstrated significantly superior performance relative to the state of the art. At present the APC Nb₃Sn conductors have reached the critical current density (J_c) specification required by the 16 T dipole magnets for the proposed Future Circular Collider (FCC)-hh. In addition to the higher J_c at high magnetic fields, the APC Nb₃Sn conductors also show several other interesting characteristics that are useful for high-field accelerator magnets.

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Footnotes

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Yes

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