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Highly Formable Tantalum Barrier for Nb₃Sn Conductors

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Ta diffusion barrier integrity is critical in the development of higher Nb ratios in internal-tin (IT) conductors. Current fabrication methodologies predominantly employ conventional wrapped Ta sheet, which deform non-uniformly during wire drawing. This leads to non-uniform Ta layers, with thickness varying between 10-2 microns as evident from IT cross-sectional images. The objective of this work is to present strategies to replace conventional Ta sheet material with severe plastic deformation (SPD)-processed, uniform, fine-grain material. Preliminary work has demonstrated that simply replacing the sheet with SPD-processed sheet improves the layer drawability in wrapped composite tubular components. Innovative SPD strategies have led to the development of "weld-healing" of electron beam (EB) welds in Ta tube. We will present ongoing work on the weld-healing path as well as development of seamless fine grained Ta capable of higher thickness reductions. Microstructural and mechanical test results will be discussed.

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