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Wed-Af-Po3.21-09 [75]: Performance Improvements to Nb3Sn Superconducting Wires by bronze route

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High performance Nb3Sn superconducting wires, which have high critical current density and low hysteresis loss, are desired for high-field magnet systems. To meet the requirements, investigations on increasing the Sn concentration in the bronze matrix, improving arrangement of Nb filaments and examining a new design of diffusion barrier were carried out. Wires with critical current at 4.2K and 12T above 300A and hysteresis loss at 4.2K and ±3T below 300mJ/cm3 were manufactured. Finer filaments were obtained which are helpful for increasing critical current density. Small and uniform Nb3Sn grains were formed after a long reaction heat treatment. A higher Sn content in matrix led a higher Sn content in Nb3Sn phase, which resulted in a higher critical current density. Using tantalum as diffusion barrier material has a great effect on decreasing hysteresis loss.

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