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## Fri-Af-Po.08-08: Preparation and performance research of superconducting switching wire

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Superconducting switch wire is a key component in the superconducting magnet. If the superconducting magnet quenches during operation, the superconducting switch wire will disconnect automatically to protect the magnet from being damaged. Given the characteristic of high-resistance, the copper-nickel alloy is commonly the prime material for the matrix of switch wire. However, the high hardness of the copper-nickel alloy makes the preparation of superconducting switch wire extremely difficult. In the present study, a novel 631 filament NbTi/CuNi superconducting switch wire was successfully designed and fabricated. It is characterized by a gradient change in the nickel content within the wire matrix, which effectively improves the applicability of the superconducting switch wire. The lower nickel content in the outer layer facilitates the use of the wire, while the higher nickel content in the inner layer ensures the wire resistance. The nickel content difference between the outer and inner layers can reach 45 wt%. Then, the NbTi/CuNi superconducting switch wire with the diameter of 1.041 mm, with the ratio of CuNi/SC of 1.1 was obtained. The  $I_c$  at 5 T & 4.2 K of the wire is 676.9 A and the line resistance is 448 m $\Omega$ /m. The Western Superconducting Technologies Co., Ltd (WST) has already achieved mass production of various types of NbTi/CuNi superconducting switch wire. At present, WST superconducting switch wire and cable has been successfully delivered to many different superconducting magnet manufacturers in countries all over the world, and received good reviews and feedback.

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