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Fri-Af-Po.08-10: Diffusion behavior and Investigation of the Properties of High Jc Nb3Sn Wires with SnCuTi Alloy Application

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In the development of high-Jc superconducting wires, the formation of Nb3Sn is critical, and KAT utilizes Nb filaments combined with SnTi alloy to facilitate Nb3Sn formation. In this study, a ternary alloy was fabricated by incorporating 5 wt% Cu into SnTi alloy via powder metallurgy, resulting in micro-sized SnCuTi alloy particles. These particles were then incorporated into high-Jc wires, followed by a series of heat treatments to examine phase changes and their effects on the wire properties. The addition of 5 wt% Cu is expected to reduce the Sn content, potentially leading to a decrease in the formation of Nb3Sn and, consequently, a deterioration in the critical current (Ic) characteristics. However, it is anticipated that during the Sn diffusion process, the presence of Cu within the SnCuTi alloy will promote a more stable solid-state diffusion compared to SnTi, thus mitigating the negative effects of Sn reduction. This paper thoroughly investigates the resulting phase transformations and their impact on the material's properties, providing insights into whether the observed changes align with the expected degradation or contribute to performance enhancement.

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