

The Influence of W Addition on Cube Textured Ni Substrates for YBCO Coated Conductor

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We fabricated cube-textured Ni and Ni-W alloy substrates for coated conductors and characterized the effects of W addition on microstructure, mechanical strength, and magnetic properties of the substrate. Pure Ni and Ni-W(2, 3, 5 at.%) alloys were prepared by plasma arc melting and then heavily cold rolled and annealed at various temperatures of 600-1300 °C. The texture and microstructure were evaluated by Pole-figure with X-ray goniometer and optical microscopy, respectively. Mechanical properties were investigated by micro Vickers hardness and tension test. Ferromagnetism of the substrate was measured by physical property measurement system (PPMS).

It was observed that Ni-W substrates had sharp cube texture and the full-width at half-maximums (FWHM) of in-plane texture was 4.42°~5.57°, which is better than that of pure Ni substrate. In addition cube texture of Ni-W substrates retained at higher temperature up to 1300 °C. Microstructural observation showed that the Ni-W substrates had fine grain size and higher mechanical properties than those of the pure Ni substrate. The effects of W addition to Ni on microstructure, texture, mechanical properties and ferromagnetism will be presented in detail.

keywords : cube-texture, plasma arc melting, pole-figure, ferromagnetism

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