

후막 SmBCO/IBAD-MgO 초전도 박막선재의 제조

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Fabrication of Thick SmBCO/IBAD-MgO coated conductor

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Abstract : Coated conductor is required to have good critical current property for high efficiency of electric power applications. Until now, long coated conductor does not show high J_c over 3 MA/cm^2 in thick superconducting layer because of texture degradation by thick superconducting layer. In this study, in order to overcome this issue, thicker superconducting layer was deposited with optimized conditions to reduce the degradation of critical current density. SmBCO superconducting coated conductor was deposited with 1~3 μm of thickness at $750\sim 850^\circ\text{C}$ under 15~20 mTorr of oxygen partial pressure using batch type EDDC(evaporation using drum in dual chamber). The buffered substrate for superconducting layer deposition was used IBAD-MgO template with the architecture of $\text{LaMnO}_3/\text{MgO}/\text{Y}_2\text{O}_3/\text{Al}_2\text{O}_3/\text{Hastelloy}$. After fabrication of coated conductor, critical current was measured by 4-probe method under self-magnetic field and 77K. In addition, surface morphology and texture were analyzed by SEM and XRD, respectively. 3 μm thick SmBCO coated conductor shows highest I_c values of 638A/cm-w in 1 m long in the world.

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