Deposition of YBCO Films on Ag Substrate by a MOCVD Method

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YBCO superconducting layer are deposited on the multiple oxide layers, named CYC (CeO_2/YSZ/CeO_2) template that was deposited on textured Ni substrate. The CYC buffers are necessary to inhibit the reaction between the superconducting layer and Ni substrate. The use of the multiple layers, however, increases the production cost of the coated conductor. Many researchers are thus looking for single buffer layer. In this sense, the metallic silver will be a good candidate for a substrate of the coated conductor because there is no significant reaction between a silver and YBCO.

We prepared YBCO coated conductor by direct deposition of YBCO on Ag substrate by a MOCVD method. The Ag substrate was prepared by cold rolling and subsequent annealing for the texture formation. The cold rolled Ag tape showed the formation of (220) texture, but the (220) texture became weak and (420) texture was strengthened after annealing. We deposited YBCO on the Ag substrates and the texture of the YBCO films was examined. Processing variables were the oxygen partial pressure (P_{O2}), deposition temperature (T_d) and the distance between the shower head and substrate. It was found that the a-axis films were grown at lower T_d, while the c-axis films were grown at the higher T_d. The surface of the films consisted of a second inclusion phase dispersed at the YBCO matrix. The Cu-rich phase regions were observed at the YBCO/Ag interface probably due to the inter-diffusion of Ag and Cu. We discuss the growth mechanism of the YBCO films on the Ag substrate, together with the formation of the texture in Ag tapes.

keywords : Ag substrate, Cu-rich phase, inter-diffusion of Ag and Cu

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