

## Deposition of Y-Sm Oxide onto Metallic Substrates for the YBCO Coated Conductor in the MOCVD System

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Complex single buffer composed of yttrium and samarium oxide was deposited onto the metallic substrates by the MOCVD (metal organic chemical vapor deposition) method using single liquid sources. Two different types of the substrates with in-plane textures of about 8~10 degree prepared by the powder metallurgy process from Ni and Ni-3at.%W alloy were used in this study. To minimize the lattice mismatch of the complex single buffers with both of the substrates and the YBCO, the mole ratios of Y(tmhd : 2,2,6,6-tetramethyl-3,5-heptanedionate) : Sm(tmhd) of liquid sources were varied from 0.3 : 0.7 to 0.5 : 0.5. The  $(Y_xSm_{1-x})_2O_3$  films were deposited for 10 minutes at the total pressure of 10 Torr and the temperatures of 500~800°C. Not only O<sub>2</sub> but also H<sub>2</sub>O vapor used to prevent the formation of the NiO on the surface of the metallic substrates. To optimize the deposition condition, the flow rates of O<sub>2</sub> and H<sub>2</sub>O vapor were changed from 0 to 1000 sccm. The epitaxial growth of  $(Y_xSm_{1-x})_2O_3$  was observed up to 500°C. However, it was found that the formation of NiO phases accelerated with deposition temperature by the XRD analyses. By supplying of H<sub>2</sub>O vapor, this oxidation of the substrates could be controlled throughout the deposition temperatures. The lowest temperature of the epitaxial growth of  $(Y_xSm_{1-x})_2O_3$  was detected as 650°C at the H<sub>2</sub>O vapor supplying system. The competitive (222) and (400) growths were observed at low deposition temperatures up to 750°C, but the (400) growth became dominant above 800°C. While the thickness of the films increased with deposition temperature, the uniformity and roughness of the films got worse. The best epitaxy was found from the  $(Y_xSm_{1-x})_2O_3$  films with thickness of 1.6 micron prepared at the deposition temperature of 800°C. It was thought that the  $(Y_xSm_{1-x})_2O_3$ -buffered metallic substrates manufactured in this study were strong candidates in the field of YBCO coated conductor.

keywords: MOCVD, single buffer, YBCO coated conductor

감사의 글

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