

Substrate Dependence of CeO₂ and Yb₂O₃ Buffer Layers Prepared by MOCVD Method

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Buffer layers such as CeO₂ and Yb₂O₃ films for YBCO coated conductors were deposited on (100) SrTiO₃ single crystal and Ni (or Ni-3 at.% W) substrate by a metal organic chemical vapor deposition (MOCVD) system of hot-wall type using a single source. The substrates were moved with the velocity of 40 cm/hr. Source flow rate, Ar/O₂ flow rate and deposition temperature were main processing variables. The degree of film epitaxy and surface morphology were investigated using XRD and SEM, respectively. On STO substrate, the CeO₂ and Yb₂O₃ films were well grown epitaxially above the deposition temperatures of 450°C and 600°C, respectively. However, on Ni substrate, the XRD showed NiO (111) and (200) peaks due to Ni oxidation as well as (222) and (400) film growth. For the films deposited with oxygen gas as oxygen source, it was found that the NiO film was formed at the interface between the buffer layer and the Ni substrate. The NiO layer interrupts the epitaxial growth of the buffer layer. It seems that the epitaxial growth of the buffer layer on Ni metal substrate is impossible in case of using oxygen gas. We are considering new method avoiding Ni oxidation using H₂O vapor instead of O₂ gas [See Jun-Kyu Choi et al., "Deposition of Y-Sm oxide onto metallic substrates for the YBCO coated conductor in the MOCVD system" in this conference]

keywords : buffer layer, MOCVD, coated conductor, Ni oxidation

감사의 글

본 연구는 산업자원부 전력산업기반기금 과제의 연구비 지원으로 수행되었습니다.