

Influence of Ag and Cu Impurity Layers on Microstructure and Superconducting Properties of MgB₂ Thick Films

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Superconducting MgB₂ thick films were fabricated on (0001) Al₂O₃ substrates with Ag and Cu impurity layers by using hybrid physical-chemical vapor deposition (HPCVD) process. The influence of thickness of impurity layers on microstructure and superconducting properties of MgB₂ films has been investigated. The crystal structure of the films was studied using XRD, which indicates that the films were *c*-axis oriented. Scanning electron microscopy revealed that the MgB₂ grain connectivity increased with increasing the Ag layer thickness. MgB₂ grain size is increased with increasing the Cu layer thickness as observed from SEM images. MgB₂ films with Ag or Cu impurity layers showed significant increase of critical current density, J_c , compared to the pure MgB₂ sample. We believe that the enhanced critical current density results from the pinning by boundaries of columnar grains and possible point defects caused by the Ag or Cu impurity layers.

Keywords: MgB₂ films, microstructure, Ag or Cu impurity layers, defects