Fabrication of YBCO Multilayer Films with Alternating SmBCO Layers by TFA-MOD Method

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SmBCO/YBCO and YBCO multi-layer films were prepared on $LaAlO_3$ (001) single crystal by the metal-organic deposition using trifluoroacetates (TFA-MOD). Multilayer films were prepared by repeating coating and calcinations process. The film thickness of SmBCO layer was controlled to 1/10 to that of YBCO film by using the starting solutions with different molarities(2 mole and 0.2 mole, respectively). Calcination heat treatment was performed at 400℃ in O_2 atmosphere and conversion heat treatment was carried out at 800℃ for 2h in flowing Ar gas containing 1000ppm oxygen with a humidity of 9.45%. Scanning electronic microscopy (SEM) and X-ray diffraction (XRD) observations revealed that films are dense and highly textured with (00l) planes parallel to substrate. Critical current (I_c) was 40A at 77K and self-field for the YBCO/SmBCO/YBCO multi-layers with single SmBCO insert layer. I_c was decreased with further stacking of SmBCO and YBCO layers. The effects of multi-layer on the microstructure and YBCO and SmBCO phase formation will be discussed.

Keywords : multi-layer, high I_c, YBCO/SmBCO, microstructure