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Enhanced critical current density in TFA-MOD $(Y_{0.77}Gd_{0.23})Ba_2Cu_3O_y$+$BaHfO_3$ films on CeO_2 buffered *R*-Al_2O_3 substrates

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$REBa_2Cu_3O_y$ (REBCO) coated conductors produced by the trifluoroacetate metal organic deposition (TFA-MOD) process are promising candidates for applications, because of the low cost and high superconducting performance. The *R*-Al_2O_3 substrate is a good candidate for a high sensitivity REBCO resonator filter because of the low dielectric constant. For the resonator filter application, a $(Y_{0.77},Gd_{0.23})Ba_2Cu_3O_y$ ((Y,Gd)BCO) film with high critical current density (J_c) is required because the surface resistance (R_s) is strongly correlated with J_c ($R_s\mu(1/J_c)$)[1]. Recently, the TFA-MOD (Y,Gd)BCO films on CeO_2 buffered *R*-Al_2O_3 substrates indicate that the high self-field J_c ($J_c^{s.f.}$) of (Y,Gd)BCO films increases with increasing density of incoherent $BaMO_3$ (M=Zr, Hf, Sn) nanoparticles (NPs) [2,3]. For further improvement of the J_c, introducing a high density of BMO NPs as flux pinning centers without degradation of crystallinity and critical temperature (T_c) is key.

In this work, in order to investigate the effect of $BaHfO_3$ (BHO) NPs on the superconducting properties, we fabricated the (Y,Gd)BCO and (Y,Gd)BCO+BHO films on CeO_2 buffered *R*-Al_2O_3 substrates using the TFA-MOD process. The (Y,Gd)BCO+BHO film shows higher $J_c^{s.f.}$ without T_c degradation compared with that of standard (Y,Gd)BCO film. We will discuss the mechanism of improvement of the $J_c^{s.f.}$ by the introduction of BHO NPs based on crystallinity, T_c and microstructure.

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