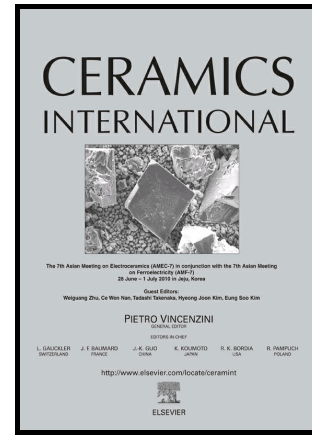


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Improvement of flux pinning in $\text{GdBa}_2\text{Cu}_3\text{O}_{7-\delta}$ thin film by nanoscale ferromagnetic $\text{La}_{0.67}\text{Sr}_{0.33}\text{MnO}_3$ pretreatment of substrate surface

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Improvement of flux pinning in $\text{GdBa}_2\text{Cu}_3\text{O}_{7-\delta}$ thin film by nanoscale**ferromagnetic $\text{La}_{0.67}\text{Sr}_{0.33}\text{MnO}_3$ pretreatment of substrate surface**

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Abstract: The present paper presents the effects of ferromagnetic $\text{La}_{0.67}\text{Sr}_{0.33}\text{MnO}_3$ (LSMO) nanoparticles on the pinning characteristics of an epitaxial $\text{GdBa}_2\text{Cu}_3\text{O}_{7-\delta}$ ((Gd) BCO) film deposited on top. LSMO nanoparticles with the size between 10 to 20 nm were obtained on a (001) STO substrate by RF sputtering method. The analyses of magnetic measurements revealed that the presence of a complex vortex pinning mechanism within the (Gd) BCO film deposited on the undecorated substrate. With respect to a reference (Gd) BCO film, two additional pinning effects in LSMO decorated (Gd) BCO film were observed. One is the effect of the threading dislocations due to LSMO nanoparticles,

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