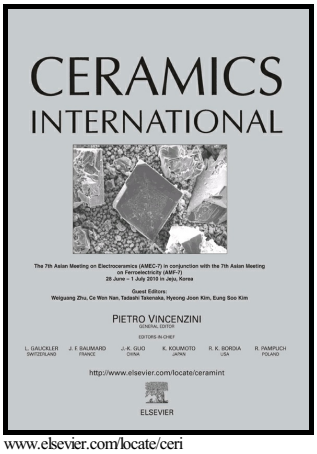

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Improvement of flux pinning in $GdBa_2Cu_3O_{7-\delta}$ thin film by nanoscale ferromagnetic $La_{0.67}Sr_{0.33}MnO_3$ pretreatment of substrate surface

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Abstract: The present paper presents the effects of ferromagnetic $La_{0.67}Sr_{0.33}MnO_3$ (LSMO) nanoparticles on the pinning characteristics of an epitaxial $GdBa_2Cu_3O_{7-\delta}$ ((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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