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Strain induced morphological instability of epitaxial $YBa_2Cu_3O_{7-\delta}$ films deposited on LAO and STO. PRIYA.V. CHINTA, O. LOZANO, P. WADEKAR, Q.Y. CHEN*, X.M. WANG, J.R. LIU, W.K. CHU, Dep. of Physics and TcSUH, University of Houston, TX, H.W. SEO, Dep. of Physics, University of Arkansas, AR, L.W. TU, H.M. HUANG, Y.L. CHENG, C.P. SUN, H.D. YANG, Dep. of Physics and Center for Nanoscience and Nanotechnology, National Sun Yat-Sen University, NSYSU, Taiwan — Surface morphological instabilities in superconducting YBCO films have not yet been fully understood because of the intractably involved underlying driving forces. In this work we attempted to pin-point the lattice mismatch effect on the evolution of surface morphology for YBCO films on $LaAlO_3$ and $SrTiO_3$ substrates grown epitaxially by DC magnetron sputtering or laser ablation. The initial root-mean-square roughness of the samples was about 10-15 nm. This value was reduced to 1-3 nm after the samples were subjected to a 30-keV $(Ar)_n^+$ gas cluster ion beam (GCIB) sputtering at right angle to a dose of $2\times10^{16}/cm^2$. Controlled annealing of these smoothened films in flowing O_2 atmosphere was then conducted at different temperatures and time periods, upon which consistent surface roughening (SR) was observed. This SR is attributed to the elastic strain of lattice-mismatch between the film and substrate. The effects of interface coherency on such phenomenon will be discussed. *Also with NSYSU

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