

Growth of High-Tc Superconducting YBa₂Cu₃O_{7-y} Thin Films on Nd_{0.2}Sr_{0.8}MnO₃ Buffered SrTiO₃(110)Substrates

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ABSTRACT

YBa₂Cu₃O_{7-y} (YBCO) thin films have been deposited by rf magnetron sputtering on the (110) plane of SrTiO₃ (STO) substrates with different growth temperatures. The YBCO films were characterized by x-ray diffraction, the atomic force microscope (AFM), magnetization measurement, and resistivity measurement. The x-ray θ - 2θ diffraction scans show a good out-of-plane YBCO [110] orientated growth. The x-ray ω -scan diffraction shows the in-plane orientations of YBCO [001] parallel to the substrate SrTiO₃ (STO) [001] and YBCO [1 $\bar{1}$ 0] parallel to STO [1 $\bar{1}$ 0]. The influences of growth temperature on the surface roughness, the superconducting critical temperature, and the resistivity for our YBCO films are studied. The anisotropic transport properties are measured on patterned [110]-oriented YBCO films deposited at 720 oC. The activation energy deduced from the resistivity-temperature measurement shows a stronger pinning in the YBCO [1 $\bar{1}$ 0] orientation. The results are discussed.

Keywords : YBCO ; NSMO ; buffer layer

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