

Epitaxial growth of thick YBCO films by MOD method at low pressure atmosphere

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The $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ films with the thickness over 1.0 micrometer were prepared reel to reel on $\text{LaMnO}_3/\text{homoepi-MgO}/\text{IBAD-MgO}/\text{Y}_2\text{O}_3/\text{Al}_2\text{O}_3/\text{Hastelloy}$ by metal organic decomposition method at low pressure atmosphere which was an efficient way to short the crystallization time and reduce the gas consumption. The influences of crystallization temperature, water partial pressure, oxygen partial pressure and fluorine content of precursor before nucleation on the properties of films were explored systematically at the total pressure from 30 to 300Pa. It was confirmed that a-axis YBCO grains was easy to form if fluorine content in the precursor films before nucleation is too high or too low. High oxygen partial pressure and low water partial pressure is good to enhance nucleate density. And the HF gas concentration is critical factor of the nucleation and growth of the film, which will control the nucleation density and growth rate. To optimize these factors, purely c-axis grains and high nucleation density film was obtained with the J_c above 1.9MA/cm².