

PLD법에 의한 혼합된 희토류계 $(\text{Nd}_{1/3}\text{Eu}_{1/3}\text{Gd}_{1/3})\text{Ba}_2\text{Cu}_3\text{O}_{7-x}$ 고온 초전도 박막

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Mixed rare earth $(\text{Nd}_{1/3}\text{Eu}_{1/3}\text{Gd}_{1/3})\text{Ba}_2\text{Cu}_3\text{O}_{7-d}$ thin films by PLD

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Abstract : In order to investigate the possibility of using mixed rare earth $(\text{Nd}_{1/3}\text{Eu}_{1/3}\text{Gd}_{1/3})\text{Ba}_2\text{Cu}_3\text{O}_{7-x}$ (NEG123) as the superconducting layer of the HTS coated conductor, the NEG123 thin film was deposited epitaxially on LAO(100) single crystal and IBAD_YSZ metal templates by pulsed laser deposition. Systematic studies were carried out to investigate the influences of deposition parameters of PLD on the micro structure, texture and superconducting properties of NEG-123 coated conductor. Deposition at oxygen partial pressure of 600 mTorr was needed to routinely obtain high quality NEG123 films with J_c 's (77K) over 2 MA/cm^2 and T_c 's over 90K ($\Delta T \sim 2 \text{ K}$). We verified from magnetization study that the NEG123 has an improved in-field J_c as the field increases at temperatures between 10 K and 77 K compared with Gd123. The J_c (77K, self field) and the value of onset T_c of NEG123 thin film on LAO substrate was 4.0 MA/cm^2 and 92K, respectively. This is the first report, to the best of our knowledge, of coated conductors with NEG123 film as the superconducting layer which have I_c and J_c over 40 A/cm-width and 1.6 MA/cm^2 at 77K, self field. This study shows the possibility of using NEG123 film as the superconducting layer of the HTS coated conductor which can be used in high magnetic field power electric devices.

Key Words : mixed rare earth, NEG123, Gd123, REBCO, coated conductor, pulsed laser deposition

