



Contribution ID: 531 Contribution code: WED-PO2-607-08

Type: Poster

Superconducting properties of Ce and La co-doped RE123 thin films fabricated by fluorine-free MOD method

Wednesday 17 November 2021 10:30 (20 minutes)

We have fabricated Ce and La co-doped Gd123 thin films on LaAlO_3 single crystal substrates by the fluorine free metal organic deposition method (FF-MOD). From our previous study, it is confirmed that Ce doping is effective in introducing artificial pinning centers (APCs) into $\text{GdBa}_2\text{Cu}_3\text{O}_y$ coated conductors. In addition, La doping promotes crystallization and crystal growth of the superconducting phase. By possessing both advantages, Ce 2.0 mol% and La 1.0 mol% co-doped Gd123 film achieved high critical current densities of 0.267 MA cm^{-2} at 1.0 T, 77.3 K. This improved by about 84% than that for non-doped one. To investigate the effectiveness by other rare earth doping, we also have replaced Gd to them and evaluated those superconducting properties.

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Session Classification: WED-PO2-607 Coated Conductor Processing and Flux Pinning