

Suppression of Surface Nucleation of $\text{YBa}_2\text{Cu}_3\text{O}_{7-y}$ by CeO_2 Coating in Top-seeded Melt Processed YBCO Superconductors

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Undesirable surface nucleation is often observed during top-seeded melt texture process of YBCO superconductors. The surface nucleation makes it difficult to make single grain YBCO superconductor. It is thus necessary to suppress the surface nucleation. The effect way to prevent the surface nucleation is the surface coating with oxides which make the liquid with a lower melting point at the surface. In this study we studied the CeO_2 coating in top-seeded melt-growth processed YBCO superconductors. It was found that the CeO_2 coating suppressed the undesirable subsidiary $\text{YBa}_2\text{Cu}_3\text{O}_{7-y}$ nucleation both at the compact walls and bottom. The CeO_2 reacted with barium to form BaCeO_3 , which produced the pseudo-peritectic (p1) melt near the compact surfaces whose solidification temperature is lower than that of the compact interior. The CeO_2 coating gave an additional advantage of producing fine Y_2BaCuO_5 particles in the 123 compact regions near the CeO_2 coating.

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