

Modified Process Development for $\text{YBa}_2\text{Cu}_3\text{O}_x$ Single Crystal Growth

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This paper presents the fabrication results of $\text{YBa}_2\text{Cu}_3\text{O}_x$ single crystal with volume $4 \times 4 \text{ cm}^2$ through variation of partial melting temperature, cooling rate and time in heat treatment processing.

The composition of starting powder were $\text{YBa}_2\text{Cu}_3\text{O}_x(\text{Y123}) + 30 \text{ mol}\% \text{ Y}_2\text{O}_3 + 1\% \text{ CeO}_2$. Heterogeneous nucleations were constrained by painting Y_2O_3 -paste on bottom and side of specimen. The single grain was grown by top seeded melt growth(TSMG) method. $\text{Sm}_{1.8}\text{Ba}_{2.4}\text{Cu}_{3.4}\text{O}_x$ with size of $2 \times 2 \times 1 \text{ mm}^3$ used as seed crystal.

Using this method, we successfully fabricated a large single grain $\text{YBa}_2\text{Cu}_3\text{O}$ and analyzed the stability of crystal growth based on phase diagram and thermodynamic.

keywords : $\text{YBa}_2\text{Cu}_3\text{O}_x$, single crystal, heat treatment processing