Abstract Submitted for the MAR07 Meeting of The American Physical Society

Growth and superconductivity of single crystals La_{2-x}Ba_xCuO₄ G. D. GU, J. S. WEN, Z. J. XU, G. Y. XU, J. M. TRANQUADA, Q. LI, A. R. MOODENBAUGH, 1. Brookhaven National Laboratory, USA, K. YAMADA, Institute for Materials Research, Tohoku University, Katahira, Sendai 980-8577, Japan — In 1986, Bednorz and Muller made a great discovery of the high temperature superconductivity in $La_{2-x}Ba_xCuO_4$ cuprate materials. Since the discovery of the superconductivity in high temperature superconducting oxide La_{2-x}Ba_xCuO₄, a large number of groups have attempted to grow the single crystals. However, no single crystal $La_{2-x}Ba_xCuO_4$ with x>0.11 has been successfully grown. In this work, the effects of the growth condition and the compositions of a feed rod on the crystal growth of $La_{2-x}Ba_xCuO_4$ has been studied by an infrared image floating zone method. The experimental result shows that a planar solid-liquid growing interface tends to break down into a cellular interface when the growth velocity is more than 1 mm/h. When the planar solid-liquid growing interface break down into a cellular interface, the single crystal size decreases abruptly and the as-grown rod is not single phase. The large single crystals of $La_{2-x}Ba_xCuO_4$ with x=0 to 0.165 has been successfully grown. The single crystals of La_{2-x}Ba_xCuO₄with x=0 to 0.165 up to 6 mm diameter and 150 mm length have been grown. The superconductivity transition temperature T_c of as-grown single crystals of $La_{2-x}Ba_xCuO_4(x=0 \text{ to } 0.165)$ have been measured.

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Date submitted: 20 Nov 2006 Electronic form version 1.4