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Crystal growth of superconducting materials $La_{2-x}Ba_xCuO_4$
GENDA GU, J.S. WEN, Z.J. XU, J.M. TRANQUADA, BNL — Since the discovery of the superconductivity in high temperature superconducting oxide $La_{2-x}Ba_xCuO_4$ in 1986, 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 project, 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 $La_{2-x}Ba_xCuO_4$ with 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 to 0.165) have been measured.

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