P-049 TSFZ 方法より成長した $\text{PrBa}_2\text{Cu}_3\text{O}_x$ 単結晶の構造変化鄒 志剛、葉金花¹、岡邦彦、西原美一²

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Study of structural change of $\text{PrBa}_2\text{Cu}_3\text{O}_x$ grown by TSFZ methodZ. Zou, J. Ye¹, K. Oka & Y. Nishihara²

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It has been widely known that $\text{PrBa}_2\text{Cu}_3\text{O}_x$ (PrBCO) is a no-superconducting material but it is structurally and chemically a member of the rare-earth perovskite family described by the “123” stoichiometry $(\text{R})\text{Ba}_2\text{Cu}_3\text{O}_7$. Recently, we have observed the bulk superconductivity in PrBCO single crystal grown by travelling solvent floating-zone (TSFZ) method in oxygen-reduced atmosphere.[1] The pressure effects on structure and T_c in superconducting PrBCO has been studied by J. Ye *et al.* [2]

The present work was undertaken, mainly, with the aim to investigate the structure dependence of superconductivity of PrBCO. The crystal structures of a no-superconducting crystal grown by flux method, and a superconducting crystal grown by TSFZ method were studied and compared. The occupancy of the Cu(1) site in as-grown TSFZ and flux crystals was observed to be 0.99(1) and 0.70(1), respectively. In the TSFZ crystal, a large number of deficiency is found in embodying c plane. These defects could be relaxed by oxygen annealing. The relaxation of defects leads to decrease of c -lattice parameter. Electrical-resistivity measurements showed that some annealed crystals exhibit superconductivity with the T_c ranging from ~25 K to 80 K.

[1] Z. Zou et al., Jpn. J. Appl. Phys. 36 (1997) 18

[2] J. Ye et al., The Review of High Pressure Science and Technology, to be published