

Optimization of the Pr doping in the $(\text{Bi}_{1.7}\text{Pb}_{0.3})(\text{Sr}_{2-x}\text{Pr}_x)\text{CuO}_{6+\delta}$ superconducting series

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A series of Bi-2201 having the nominal composition of $(\text{Bi}_{1.7}\text{Pb}_{0.3})(\text{Sr}_{2-x}\text{Pr}_x)\text{CuO}_{6+\delta}$ with $0 \leq x \leq 0.50$ was prepared by the solid state reaction method. All of them have the orthorhombic phase with a space group of Ama_2 . Orthorhombicity, $2(a - b)/(a + b)$, decreases with increasing the amount of Pr content. The highest T_c (20.1 K) is found in the sample with $x = 0.40$, which has an optimal hole concentration of 0.278(2) analyzed by an iodometric titration. XANES spectra show that valences of the Bi, Pb and Pr are 3+, 2+ and 3+, respectively. Hole concentrations with respect to the amount of Pr substitution investigated by the titration method have the same trend with those obtained by the L -edge Cu XANES spectra