

# Properties of the Bi-surplus superconducting $\text{Bi}_{2.1-x}\text{Pb}_x\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_y$ compounds

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Abstract: Properties of the Bi-surplus superconducting  $\text{Bi}_{2.1-x}\text{Pb}_x\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_y$  ( $x = 0.00-0.60$ ) compounds have been investigated. It is found that Pb plays a very important role in the formation of the superconducting phases with high purity and especially in promoting and enhancing the stability of the 2223 phase in (Bi,Pb)-Sr-Ca-Cu-O compounds. By increasing the duration of the heat treatment, the single-phase region will be widened, while the transition temperatures and values of zero-resistance remain nearly unchanged. With suitable heat treatment, the 120 K high- $T_C$  phase can be synthesized by the solid-state reaction method. The superconducting fraction reaches a maximum in the compounds with  $x = 0.30-0.60$ . Special attention is paid that the superconducting state is destroyed by annealing in vacuum for the compound with  $x = 0.40$ . © 2003 Elsevier Science B.V. All rights reserved.

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