EFFECT OF Ni SUBSTITUTION ON T_c IN THE (Bi, Pb)-Sr-Ca-Cu-O SUPERCONDUCTING MATERIAL

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Properties of a series of superconducting compounds $(Bi_{0.7}Pb_{0.3})SrCa(Cu_{1.5-x}Ni_x)0_\delta$, where x ranges from 0 to 1.1 have been investigated using electrical resistivity, ac magnetic susceptibility, and X-ray powder diffraction measurements. Up to $x = 0.2$ composition, T_c drops down to ~ 60 K rather fast. From $x = 0.2$ to 0.95 the material remains superconducting with T_c around ~ 50 K. For $x \geq 1.0$, the material becomes semiconducting. The fact that even the compound with Ni:Cu = 0.95:0.55 is superconducting with T_c around 50 K may suggest the possibility of stronger exchange-mediated pairing effect in this material than in the Ni-doped $YBa_2Cu_3O_{7-\delta}$ material. Changes in electrical, magnetic, and structural properties of the series of materials with different Ni concentrations have been investigated.