Turkish Journal of Physics

Turkish Journal

of

Physics

Properties of Ag-Doped $Bi_{(1.6)}Pb_{(0.4)}Sr_2Ca_3Cu_{(4-x)}Ag_xO_y$ (2234) Oxides Prepared by S.S.R. Method

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Keywords
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Scientific Journals Home Page

Abstract: The effect of Ag-doping $Bi_{1.6}Pb_{0.4}Sr_2Ca_3Cu_{4-x}Ag_xO_y$ compounds (x=0.0-1.0), prepared by conventional Solid-State-Reaction (SSR) technique, was studied using x-ray diffraction (XRD) and electrical resistivity. The high-T_c fraction of the 2223 phase, formed from the nominal composition of 2234, decreases with increasing Ag content. From lattice parameter calculations it follows that Ag-doping the unit cell phase of $(Bi,Pb)_2Sr_2Ca_2Cu_3O_y$ is limited to the value of x\leq0.1. The zero resistance critical temperature ($T_{c,zero}$) was determined from the resistivity curves for all samples. The value of $T_{c,zero}$ decreases slightly to 106 K for x\leq0.4 and when the nominal silver content increases up to x=0.7 or more $T_{c,zero}$ strongly decreases to 72 K. The critical current density J_c at 77 K decreases dramatically as silver content increases. This result is discussed on the basis of precipitation of low-T_c 2212 and other impurity phases in $Bi_{1.6}Pb_{0.4}Sr_2Ca_3Cu_{4-x}Ag_xO_y$ compounds.

Turk. J. Phys., **24**, (2000), 129-136.
Full text: pdf
Other articles published in the same issue: Turk. J. Phys.,vol.24,iss.2.