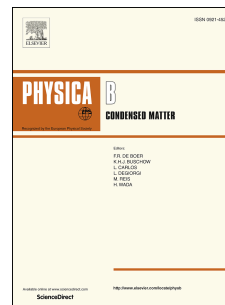


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Substitution effect of Sr^{2+} by Ca^{2+} on structure and superconducting properties of $Bi_2Sr_{1.6}La_{0.4}CuO_{6+\delta}$ (Bi-2201) ceramics

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Abstract

In this work, the effect of Ca^{2+} iso-valence substitution for Sr^{2+} on properties of $Bi_2Sr_{1.6}La_{0.4}CuO_{6+\delta}$ superconductors is presented. Samples series with nominal composition of $Bi_2Sr_{1.6-x}Ca_xLa_{0.4}CuO_{6+\delta}$ ($x= 0, 0.2, 0.4, 0.6$ and 0.8) are prepared by a solid-state reaction method. When Ca content is increased, the X-ray diffraction technique shows that the cell parameters a and c decrease, while b one is almost constant. The scanning electron microscopy analysis reveals that the substitution has no significant effect on the porosity and the grain size of the samples. The physical properties of the samples are studied by the analysis of the magneto-resistivity curves measured under magnetic fields in the range $0-1$ Tesla. As Ca is added, the results show that the high temperature transition appears and is pushed up to 94.87 K for $x=0.8$. The substitution also improves the bulk onset critical transition temperature, the transition width, the residual resistivity, the activation energy of vortices and the irreversibility field. The best results are seen for $x=0.4$ of Ca content.

Keywords: Bi-2201 phase, doping, superconductivity, magneto-resistivity.

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