Structure and Superconductivity Studies on $La_{1-x}Sc_xBa_2Cu_3O_{7-\delta}$

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The formation of $La_{1-x}Sc_xBa_2Cu_3O_{7-\delta}$, with $0.0 \leq x \leq 0.3$, has been studied by X-ray diffraction and its superconducting properties by resistivity and AC-susceptibility measurements. The purpose of this work is twofold: to test the lower limit of the rare-earth ion radius tolerated in these cuprate system [1] and to check if the presence of large La-ions at the rare-earth-sites can stabilize a structure doped with small Sc-ions. As the peritectic decomposition temperature of these phases increases with the rare-earth ion radius [2], Sc was introduced in the inicial matrix only at a much lower sintering temperature. Moreover, in order to avoid a solid solution between the larges La-ions and Ba-ions, an argon-atmosphere sintering of the matrix was necessary [3]. Diffratograms bellow showed that, althought with the presence of La_2O_3, Sc_2O_3, $BaCO_3$ and CuO minor phases, we retain an almost monophasic perovskite system up to $x = 0.3$.
Keywords: cuprates, X-ray diffraction, superconductivity, Lanthanum, Scandium.

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[1] P.Somasundaram, A.M.Ram, A.M.Umarji, C.N.R.Rao, Mat. Res. Bull. **25**, 331 (1990).
[2] C.Andreouli, A.Tsetsekou, Physica C, **291**, 274 (1997).
[3] F.Tao, G.C.Che, X.J.Zhou, Z.Zhao, C.Dong, S.L.Jia, H.Chen, Mat.Lett. **39**, 305 (1999).
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