Influence of yttrium doping on the Hg0.82Re0.18Ba2Ca(1 - x)YxCu2O6+d ceramic properties

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Hg0.82Re0.18Ba2Ca(1 - x)YxCu2O6+d ceramic have been synthesized in order to investigate the dependence of the transition temperature Tc with different yttrium (Y) content. ($0.05 < x < 0.50$. The synthesis of mercury compounds is relatively difficult when compared with other high-Tc due to their complex and unstable structures. For this reason, a careful preparation of precursor is necessary in the sealed quartz tube technique. Firstly, it was prepared the following precursors: Y2Cu2O5, Y2Ba2Cu3O8+d, YcaCuOx , YBaCuO4, Ba4CaCu3O8.25, Ba2Cu3O5+d, CaCu2O3, Y1.4BaCu1.6O5 and BaCuO2+d. Secondly, the samples were produced by the solid-vapour reaction between HgO and a stoichiometric ratio among several precursors take place in vacuum-sealed quartz tube. Taken into account that the reaction occurs in a sealed quartz tube, the choice of the precursor stoichiometric defined the sample oxygen content. The X-ray powder diffraction (XRD) analysis reveals that there is not any Y-precursor precipitation, however for $x < 0.15$ presented trace of Hg-1223 phase. The cell parameters in the superconductor samples have been calculated from the XRD spectra. The results showed that a slight increase of the c parameter while a and b parameters remain constant as a function Y nominal content. The ac magnetic susceptibility (Happ = 5 Oe and f = 200 Hz) measurements have shown reduction of Tc with the increment of the Y content. Moreover, it was observed that there is a second transition signals. The smallest and highest Tc values of our samples was 90 and 120 K, respectively. The Tc values has a behavior of inverted parabolic dependence on yttrium content. The different Tc dependence may be discussed on the basis of the pressure induced charge transfer model modified. In our opinion Y doping changed the carrier number in the inner layer and induced an over doped which reduced the Tc value.

Palavras-Chave:

Hg-1212 ceramic, magnectic susceptibility