Improvement of precursor on the Hg0.82Re0.18Ba2Ca2Cu3O8+d ceramic synthesised by the sealed quartz tube

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Hg0.82Re0.18Ba2Ca2Cu3O8+d ceramic were prepared by solid-vapour reaction technique. Firstly, the ceramic precursor were prepared with a mixture of Ba2Ca2Cu3Ox and ReO2 in powder form with the molar relationship 1 : 0.18. The obtained precursor material was then submitted to an annealing with three different partial pressure of oxygen (PO2): 5% of O2 and 95% of Ar (sample A), 10% of O2 and 90% of Ar (sample B) and 15% of O2 and 85% of Ar (sample C). X-ray powder diffraction pattern analysis of each precursor preparation step was done in order to evaluate the oxygen content of the ceramic precursor. The identified phases were BaCuO2+x, Ba2Cu3O5+x, Ba4CaCu3O8+x, Ca2CuO3 and Ca5Re2O12. The BaCuO2+x phase was found 64%, 33% and 50% from the XRD spectra for sample A, B and C, respectively. The Ba2Cu3O5+x phase was found 10%, 34% and 14% for sample A, B and C, respectively. Furthermore, the peaks associated with the BaCuO2+x, Ba2Cu3O5+x phases, which has oxygen stoichiometry variation, are slightly displaced to low angles. This is an indication that there was a oxygen increment of the precursors ceramics B and C, as compared with ceramic A. The precursors prepared with different PO2 were blended with HgO at molar relationship 1 : 0.82. The Refinement of XRD measurements indicated that the phase, Hg,Re-1223, Hg-1223, HgCaO2, BaCO3, CaCuO2 and BaCuO2+x were also found. The phase Hg,Re-1223 was very crystalline as shown by the small broadening of their peaks. The XRD spectra of all samples were quite similar and the cell parameters did not show important differences. These samples were also investigated by ac electrical resistivity measurements. Our results showed similar Tc (133.6, 133.9 and 133.7 K for sample A, B and C, respectively).

Palavras-Chave:

Hg,Re-1223 ceramic, precursor, electrical resistivity