THE STUDY OF ReO_2 STRUCTURE BY USING A REITVELD ANALISYS

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The $Hg_{1-x}Re_xBa_2Ca_2Cu_2O_{8+d}$ superconductors have shown improved properties, e.g. T_c=133K and H_{c1}= 50 mT. The rhenium (Re) doping avoids the CO_3 sample contamination, after the sample preparation. Furthermore, Re improves the critical current curve as compare with the $HgBa_2Ca_2Cu_2O_{8+d}$. Re is a bound to the same oxygen to which the copper is also bound. This oxygen is called apical oxygen and it was attributed for this oxygen the mechanism of charge transfer. This mechanism is responsible for the increment of the density of holes in the copper-oxygen layer. It is not clear until now what is the role of the Re as considering the copper-oxygen binding distance and charge transfer. X-ray powder diffraction analysis has shown that Re has an octahedral oxygen coordination in the $Hg_{1-x}Re_xBa_2Ca_2Cu_2O_{8+d}$. The ICSD and PDF source reports have suggested three different structure symmetries for ReO_2; orthorhombic, monoclinic, and hexagonal. In order to understand what is the structure of ReO_2 an X-ray powder diffraction pattern was produce by using a pure (99%)ReO_2 (Aldrich) powder. The Reitveld analysis of the X-ray powder diffraction pattern has shown there is 1% of ReO_3 in the powder sample. Furthermore, the ReO_3 was fitted by hexagonal structure, which is in agreement with the ICSD and PDF source reports. The Reitveld analysis of the ReO_2 reveals to be monoclinic $C_{2/c}$ the structure which has shown the best agreement with the measurements. This suggestion of structure is being compared to EXAFS measurements and more detailed studies are being performed.