

Study of phase segregation in Hg,Re-1223 superconducting compound using anomalous X-ray scattering

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The segregation of two phases in Hg,Re-1223 superconducting compound was firstly experimentally observed by Martinez [1]. Using Rietveld refinement of XRD data, it was observed one phase with and another without Re. This finding, here revisited using anomalous X-ray scattering through synchrotron radiation at the Brazilian Synchrotron National Laboratory – LNLS at two different energies: 6926 eV (normal condition) and 10533 eV – energy of the Re-L_{III} absorption edge - (anomalous condition). In the condition of anomalous scattering the basal plane of unit cell, where the Re atoms are located, has the scattering factor amplified relatively to normal condition and therefore the peak of the Re-containing phase will be reinforced. For the Re-free phase there is no this reinforcement and therefore the ratio between the two areas under the peaks of the phases must change, as observed in Figure 1. The detailed analysis of the 001 peak shows an asymmetry confirming the presence of two phases with slightly different parameter *c* [1,2,3]. The fit of two Lorentzian curves to this peak, for the different energies, presents different ratio between the areas underneath the fitted curves, showing that one of the phases is absent or poor in Re than the other phase.

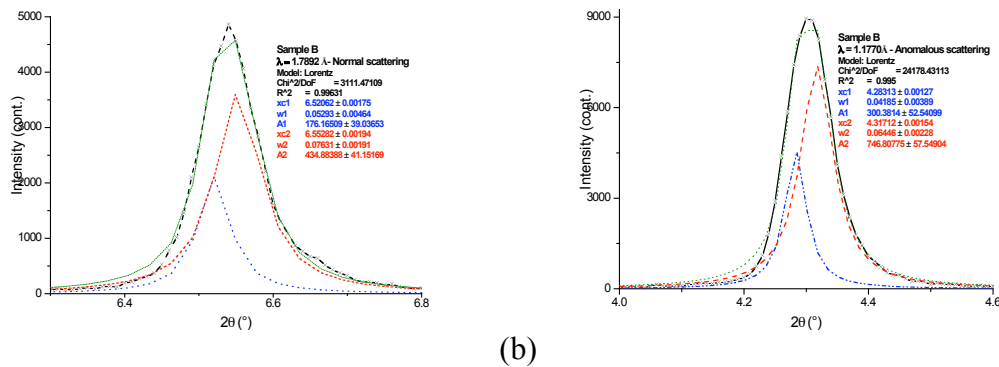


Figure 1. Detail of the 001 diffraction peaks of one of the samples at anomalous (a) and normal (b) conditions, with the fit of two Lorentzian curves.

Keywords: Hg,Re superconductor, X-ray diffraction, anomalous scattering, phase segregation.

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