103-013

Study of phase segregation in Hg,Re-1223 superconductor by anomalous X-ray scattering

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The segregation of phases in Hg,Re-1223 superconducting compound was firstly observed using Rietveld refinement of XRD data. This study is confirmed by anomalous X-ray scattering using the energy of the Re-LIII absorption edge. In the condition of anomalous scattering the basal plane of unit cell, where the Re atoms are located, has the scattering factor amplified 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 areas under the peaks of the phases must change. The detailed analysis of the 001 peak shows an asymmetry confirming the presence of two phases with slightly different parameter c. The fit of two Lorentzian curves to this peak presents different ratio between the areas of the fitted curves, showing that one of the phases is absent or poor in Re than the other phase.
Work supported by CAPES (R. Putvinskis), CNPq and LNLS.