Magnetostriction of $\mathbf{Eu_{1+x}(Ba_{1-y}R_y)_{2-x}Cu_3O_{7-d}}$ at superconducting transition

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9.7 cm

The cryogenic X-ray studies of structure deformations in the vicinity of superconducting transitions in structural series of $Eu_{1+x}(Ba_{1-y}R_y)_{2-x}Cu_3O_{7-d}$ was performed. As superconducting transition is the second order phase transition, the accompanying strains may be considered as spontaneous striction and attributed to the pressure dependence of the superconducting transition temperature T_{SN}. Though the pressure effect on T_{SN} in $RBa_2Cu_3O_{7-d}$ series proved to be important insight into major properties of the high temperature superconductors, it is not understood by now. The performed investigation of temperature effect on position and shape of diffraction maxima at cooling below T_{SN} of the samples with the different radii of the Rare Earth ions allowed us to find spontaneous magnetostriction in these compounds, estimate pressure derivative of T_{SN} and make comparison with existing models. The proposed experimental procedure enabled us recently to find out the magnetostrictive deformations in the CMR (colossal magnetoresistance) compounds with perovskitelike structure similar to that of the materials under current study. The comparative data analysis for these two groups of highly correlated electronic systems is discussed.

13.4 cm

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