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Study of lattice distortion in $Sr(Fe_{1-x}Co_x)_2As_2$ single crystals employing high-energy x-ray diffraction A. SAPKOTA, W.T. JAYASEKARA, ABHISEK PANDEY, SHREE R. BANJARA, P. DAS, N.S. SANGEETHA, D.C. JOHNSTON, A. KREYSSIG, A.I. GOLDMAN, Ames Laboratory US DOE, Department of Physics and Astronomy, Iowa State University — For the iron arsenide family of superconductors, the interplay between structure, magnetism, and superconductivity is a major theme of research. Among AFe_2As_2 (A = Ca, Sr, Ba), a difference lies in the strength of magnetoelastic coupling: it is strongest in $CaFe_2As_2$ as indicated by strongly coupled first order phase transitions (structural and magnetic) and modest in $BaFe_2As_2$ in which the two phase transitions split with Co-substitution. Moreover, similar to the structural transition, the magnetic transition becomes second order with higher Co-concentration. $SrFe_2As_2$ shows intermediate behavior. Here we present a temperature-dependent study of the lattice distortion from tetragonal to orthorhombic in $Sr(Fe_{1-x}Co_x)_2As_2$ single crystals through diffraction measurements using x-ray radiation of two energies: 8.047 keV and 100 keV. The lower energy probes a few micrometers down from the surface of the sample whereas the higher energy characterizes the bulk. Details of the lattice distortion obtained with these two probes will be discussed.

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