

Doping dependence of the lattice dynamics in $\text{Ba}(\text{Fe}_{1-x}\text{Co}_x)_2\text{As}_2$ studied by Raman spectroscopy

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We report Raman scattering measurements on iron-pnictide superconductor $\text{Ba}(\text{Fe}_{1-x}\text{Co}_x)_2\text{As}_2$ single crystals with varying cobalt x content. Upon cooling through the tetragonal-to-orthorhombic transition, we observe a large splitting of the E_g in-plane phonon modes involving Fe and As displacements. The splitting of the in-plane phonons at the transition is strongly reduced upon doping and disappears for $x = 0.06$ qualitatively following the trend displayed by the Fe magnetic moment. The origin of the splitting is discussed in terms of magnetic frustration inherent to iron-pnictide systems and we argue that such enhanced splitting may be linked to strong spin-phonon coupling.