Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Phonon probe of structural variations in $FeSe_{1-x}Te_x$ KALYAN SASMAL, Department of Physics and TcSUH,University of Houston, VIKTOR HADJIEV, MILKO ILIEV, Texas Center for Superconductivity,University of Houston, PAUL C.W. CHU, Department of Physics and TcSUH, University of Houston, Lawrence Berkeley National Laboratory, 1 Cyclotron Road, Berkeley, California 94720, RAMAN & INFRARED LABORATORY, TCSUH COLLABORATION —
In the iron chalcogenide system $FeSe_{1-x}Te_x$the superconducting compositions are produced by isovalent substitution of Te for Se. The electronic structure and magnetic properties of $FeSe_{1-x}Te_x$ also show an unusual sensitivity to the crystal structure modification with chalcogen substitution. We present the evolution of Raman active phonons in single crystals of $FeSe_{1-x}Te_x$ with x = 0.0, 0.5, 0.75, and 1.0 as measured with polarized Raman spectroscopy at room temperature. Lattice dynamics calculations of the studied compositions yield a simple eigenvector for the A_{1g} and B_{1g} modes involving vibrations along the c-axis of only Se(Te) and Fe atoms, respectively. Remarkably, the A_{1g} mode exhibits a single mode behavior thus pointing to the importance of the average structure rather than local one for the properties of iron chalcogenides. The atomic disorder associated with Te for Se substitution produces a Raman band around 150 cm^{-1} that persists also in the composition with x =1 thus reflecting the stoichiometric deviation in the actual structure $FeTe_{0.92}$ and the band is absent in FeSe.

Kalyan Sasmal
Department of Physics and TcSUH,University of Houston

Date submitted: 28 Nov 2009 Electronic form version 1.4