Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Nature of local distortions in newly-discovered disordered superconductor, $\mathbf{LaO_{1-x}F_xBiS_2}$ ANUSHIKA ATHAUDA, BING LI, SHINICHIRO YANO, SEUNGHUN LEE, DESPINA LOUCA, University of Virginia, YOSHIKAZU MIZUGUCHI, Tokyo Metropolitan University — $LaO_{1-x}F_xBiS_2$ is a disordered, non-magnetic superconductor belonging to the novel family of BiS_2 layered superconductors. The parent phase, $LaOBiS_2$, is a band insulator with tetragonal structure (P4/nmm space group). The highest T_c of $LaO_{1-x}F_xBiS_2$ is attained at x = 0.5, as 10.8 K. Upon F doping or temperature change, little change had been reported in the low-energy portion of the phonon spectrum and the question whether $LaO_{0.5}F_{0.5}BiS_2$ is a BCS superconductor or not remains unsolved. The local atomic structures of $LaOBiS_2$ and $LaO_{0.5}F_{0.5}BiS_2$ were investigated as a function of temperature by using elastic neutron scattering and the pair density function analysis from 6 to 300 K and 2 to 300K respectively. We present possible models of local structure of $LaOBiS_2$ and $LaO_{0.5}F_{0.5}BiS_2$ which qualitatively explain the temperature dependence and composition dependence.

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Date submitted: 14 Nov 2013 Electronic form version 1.4