Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Mechanically - induced disorder in $CaFe_2As_2$: a ^{57}Fe Mössbauer study[1] XIAOMING MA, Ames Laboratory/ Iowa State University and Lanzhou University, China, SHENG RAN, PAUL C. CANFIELD, SERGEY L. BUD'KO, Ames Laboratory/Iowa State University — ^{57}Fe Mössbauer spectroscopy was used to study an extremely pressure and strain sensitive compound, $CaFe_2As_2$, with different degrees of strain introduced by grinding and annealing. At the base temperature, in the antiferromagnetic/orthorhombic phase, compared to a sharp sextet Mössbauer spectrum of single crystal $CaFe_2As_2$, which is taken as an un-strained sample, an obviously broadened sextet and an extra doublet were observed for ground $CaFe_2As_2$ powders with different degrees of strain. The Mössbauer results suggest that the magnetic phase transition of $CaFe_2As_2$ can be inhomogeneously suppressed by the grinding induced strain to such an extent that the antiferromagnetic order in parts of the grains forming the powdered sample remain absent all the way down to 4.6 K. However, strain has almost no effect on the temperature dependent hyperfine magnetic field in the grains with magnetic order. The quadrupole shift in the magnetic phase approachs zero with increasing degrees of strain, indicating that the strain reduces the average lattice asymmetry at Fe atom position.

[1]Supported by US DOE under the Contract No. DE-AC02-07CH11358 and by the China Scholarship Council

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Date submitted: 30 Oct 2015 Electronic form version 1.4