Abstract Submitted
for the SHOCK13 Meeting of
The American Physical Society

High Pressure Mössbauer Spectroscopic Studies on Narrow Band $Co_{1-x}Fe_xS_2$ Systems up to 9GPa USHA CHANDRA, Department of Physics, University of Rajasthan, Jaipur 302004 India — Pyrite type 3d-transition metal disulfides exhibit a wide variety of interesting electrical and magnetic properties. CoS_2 is a ferromagnetic metal ordering ferromagnetically below ∼120K while FeS_2 is a narrow band gap diamagnetic semiconductor. Both Co and Fe are in low spin configuration. Formation of solid solutions between these two end members opens up the possibility of tuning the position of Fermi level in $Co_{1-x}Fe_xS_2$. Nano crystalline systems $Co_{1-x}Fe_xS_2$ (x=0.1 to 1.0) identically synthesized adopting solution technique were characterized by XRD, TEM. All the systems except x=0.8 showed nano sized particles. TEM micrographs taken for $Co_{0.2}Fe_{0.8}S_2$ system showed nano wires formation with SAED images indicating crystalline pattern. Electrical resistivity of bulk Ferromagnetic pyrite compounds $Fe_xCo_{1-x}S_2$ have shown an anomalous temperature dependence with increasing magnetic order below curie temperature due to the effect of a change in band width. Shift in the absorption edge with pressure in bulk pyrite FeS_2 has been attributed to large compaction of S-S bonds in comparison to Fe-S bonds. ^{57}Fe Mössbauer spectroscopic investigations on systems under high pressure are sensitive enough to probe variations in valence, spin configuration and site occupancy of Fe. The high pressure Mössbauer spectroscopic measurements using diamond anvil cell on nano crystalline $Co_{1-x}Fe_xS_2$ (x=0.2,0.5 and 0.8) would be reported to understand the pressure effect on band gap.

Usha Chandra
Department of Physics, University of Rajasthan, Jaipur 302004 India

Date submitted: 19 Feb 2013 Electronic form version 1.4