

Abstract Submitted
for the SHOCK13 Meeting of
The American Physical Society

Electrical Resistivity of natural Marcasite at High-pressures¹

GOPALAKRISHNARAO PARTHASARATHY, CSIR-National Geophysical Research Institute, Hyderabad, 500007, India — Marcasite is considered to be a common iron sulfide in reducing Martian sediments and may enclose microbial remains during growth and hence study of marcasite may have significance in the search for fossil life on Mars. The high-pressure phase stability investigations of marcasite are useful in understanding the sulfide mineralogy of Martian surface, affected by meteorite impacts. The sulfides were characterized by electron microprobe micro analyses (EPMA), powder X-ray diffraction, DTA, and FTIR spectroscopic measurements. The samples were powdered using a porcelain mortar and pestle. The chemical composition of the sample was determined by an electron probe micro-analyzer (EPMA). High-pressure electrical resistivity measurements were carried out on natural marcasite, and marcasite rich samples (Marcasite 95 mol % pyrite 5 mol %) up to 7 GPa. Marcasite sample shows a discontinuous decrease in the electrical resistivity at 5.2 (± 0.5) GPa indicating a first order phase transition. The Differential thermal analyses and the Fourier transform infrared spectroscopic measurements on the pressure quenched sample shows the characteristics of pyrite, indicating the pressure induced marcasite-to-pyrite transition of the natural marcasite at 5.2 (± 0.5) GPa. The observation of marcasite to pyrite phase transition may be useful in estimating the pressure experienced by shock events on the Martian surface as well as the meteorites where marcasite-pyrite phases coexist.

¹Financial support from CSIR-SHORE-PSC0205

Gopalakrishnarao Parthasarathy
CSIR-National Geophysical Research Institute, Hyderabad, 500007, India

Date submitted: 14 Feb 2013

Electronic form version 1.4