Mineral chemistry of Mahadevpur H4/5 chondrite: characterization of nanodiamonds through micro-Raman spectroscopic studies

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Here, we present comprehensive electron probe micro analysis, laser Raman spectroscopic and X-ray diffraction (XRD) studies on the Mahadevpur H4/5 chondrite. The calculated full width at half maximum (FWHM) value of ~14–17 cm^{-1} for the Raman peaks in the Mahadevpur meteorite is in accordance with the shock stage of S4 with medium shock pressure regime of 30–35 GPa. The nanodiamonds were characterized with the observation of Raman peaks at 1333–1358 cm^{-1} and 1600 cm^{-1}. The FWHM value of the Raman peaks reflects shock metamorphism in the meteorite. The XRD technique provides further independent validation of the nanodiamonds.

Keywords: Chondrite, mineral chemistry, nanodiamonds, shock metamorphism, spectroscopic analysis.

tain metallic Fe and Ni. Due to partial melting or the accumulation of other particles during the solidification process, many chondrules have irregular shapes, although some are rounded because they were once completely molten. Understanding the chemical composition and mineral chemistry of meteorites is essential for comprehending the history and dynamics of the solar system[2–13].

The Mahadevpur H4/5 chondrite was a multiple fall observed on 21 February 2007 at Mahadevpur (lat. 27°40′N, long. 95°47′E), near Namsai town, Arunachal Pradesh (and adjoining areas), North East India at 09:10 IST (ref. 14). The total known weight of the Mahadevpur chondrite is 70.5 kg (refs 14, 15). At present, only two ordinary chondrites of type H4/5 are found in India. The first meteorite belonging to this type was found in Kendrapara, Odisha