

**FRACTIONATION OF IMPACTOR COMPONENTS WITHIN IMPACT SPHERULES FROM LONAR CRATER, INDIA.** S. Misra<sup>1</sup> and H. Newsom<sup>2,1</sup>.<sup>1</sup>Indian Institute of Geomagnetism, Navi Mumbai- 410218, India. E-mail: misrasaumra@gmail.com. <sup>2</sup>Institute of Meteoritics, University of New Mexico, NM- 87131, USA.

**Introduction:** Evidence of fractionation of impactor components between impact melts and spherules are known from some impact craters [1,2]. In this study we report a similar fractionation seen within the spherules of different size ranges from Lonar crater (52±6 ka, ~1.8 km diameter), India, which is the only known terrestrial impact crater excavated in basaltic target rocks and most likely was formed by a chondritic impactor [3].

**Experimental Procedures:** Analyses with a JEOL 8200 microprobe, with a special H-type and large PET crystal spectrometers, at Univ. of New Mexico, used a 15 µm beam, 15 keV accelerating voltage, and 20 nA sample current. Analytical uncertainties for minor and trace elements were better than 4% except P that was ~8%.

**Spherule Morphology and Geochemistry:** The impact spherules recovered from within the ejecta from SE of crater rim can be classified into two size fractions. The mm-sized spherules have variable aerodynamic shapes (e.g., ellipsoidal, spheroid, rod, conical and teardrop) with highly vesicular surfaces. The sub-mm sized spherules are mostly spherical in shape with relatively smooth surface texture. Both types of spherules show target basalt dominated bulk chemistry except for their characteristic depletion in Na<sub>2</sub>O and P<sub>2</sub>O<sub>5</sub> by ~0.5 to 1 wt% and 0.15 wt% respectively. The sub-mm sized spherules show high abundances of Cr (~2.5 times), Co (~6 times) and Ni (~13 times) over average target basalt, whereas Co is the only transitional metal present in high proportion (~5 times) within mm-sized spherules. The impact spherules show significant variations in Cu (~25 to 400 ppm) and Zn (~10-350 ppm) compared to restricted occurrences of these elements in target-basalt (~220 and 130 ppm respectively). Additionally, both types of spherules are highly enriched in Pb (~5 to 150 times) over the unshocked basalt.

**Discussion:** Impactor components (Cr, Co, Ni) are only found within the aerodynamically shaped impact-spherules suggesting the impactor chondrite was completely vaporized. The smaller sub-mm sized spherules show a greater preference for impactor components (Cr, Co, Ni) compared to mm-sized spherules, and the very high and variable abundances of moderately volatile Cu, Zn and Pb within impact-spherules over target-basalts suggest these could be the components of the impactor incorporated within the spherules from impact plume.

**References:** [1] Mittlefehldt et al. 1992. *Meteoritics* 27: 361-370. [2] Mittlefehldt and Hörz. 1998. 29<sup>th</sup> Lunar Planetary Science Conference, abstract no. 1771. [3] Misra et al. 2009. *Meteoritics and Planetary Sciences* (in press).