**SIDEROPHILE ELEMENT DISTRIBUTION IN METAL-SULFIDE NODULES FROM EH3 SAHARA 97072.**

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**Introduction:** It is generally agreed that the enstatite chondrites formed in a highly reducing part of the inner nebula, but questions remain regarding the nature of this environment. Trace-element distributions in metal-sulfide nodules (MSN) could advance our understanding of this region. The distribution of trace [or minor] siderophile elements can provide insight into the history of their host phases since they partition differently into melt-derived phases than into phases resulting from volatility-controlled nebular evaporation and condensation. Sahara 97072 (paired with Sahara 97096) contains complex, layered MSN that were proposed as pre-accretionary nebular objects [1]. We measured siderophile element distributions to test this hypothesis.

**Methods:** We used a magnetic-sector Finnegan Element 2 – New Wave UP213 Laser Ablation Inductively-coupled Plasma Mass Spectrometry (LA-ICPMS) to gather data on the trace element distributions in kamacite, perryite [$(FeNi)_5(SiP)_2$], and schreibersite in MSN from EH3 Sahara 97072. Regions of interest were chosen on the basis of SEM energy dispersive spectroscopy element maps, electron microprobe analyses, and petrographic microscope observations. Then mineral phases > ~15 to 30 µm diameter were analyzed using LA-ICPMS

**Results:** Preliminary analyses of Fe, Co, Ni, Cu, Ga, Pd, Ru, and Ir in kamacite, schreibersite, and perryite, within MSN indicate the kamacite is enriched in the volatile elements Ga and Au normalized to Ni and relative to CI by a factor of 1.8. The kamacite Pd/Ir ratio is also higher than CI, whereas Ru and Ir are slightly depleted by the same amount and correlated. These results are similar to earlier INAA analyses [2-5]. Perryite, with up to 72 wt. % Ni, is enriched in Cu and Pd relative to kamacite. Schreibersite averages about 14 wt. % Ni and contains slightly less Ru and Pd than kamacite, whereas other elements are below detection limits. Subtle Ni and siderophile-element zoning occurs in the kamacite mantle surrounding MSN cores. The Co/Ni ratios of kamacite average 2 times, but range up to 3 times, solar. However, the weighted average Co/Ni ratio of kamacite, perryite, and schreibersite or kamacite and perryite alone is near to but less than solar, possibly indicating exsolution from a single phase.

**Conclusions:** The schreibersite could be an early condensate. The perryite composition and the subtle Ni and siderophile-element zoning in the kamacite may be explained by the redistribution of Si, Ni, Cu, and Pd during pre-accretionary heating and sulfurization events.

**References**: [1] Weisberg, M.K. and M. Prinz. *Sahara 97096: A highly primitive EH3 chondrite with layered sulfide-metal-rich chondrules*. in *29th Lunar and Planetary Science Conference*. 1998. [2] Hertogen, J., et al., *Enstatite chondrites: Trace element clues to their origin.* Geochimica et Cosmochimica Acta, 1983. **47**(12): p. 2241-2255. [3] Horan, M.F., et al., *Highly siderophile elements in chondrites.* Chemical Geology, 2003. **196**(1-4): p. 5-20. [4] Kallemeyn, G.W. and J.T. Wasson, *Compositions of enstatite (EH3, EH4,5 and EL6) chondrites: Implications regarding their formation.* Geochimica et Cosmochimica Acta, 1986. **50**(10): p. 2153-2164. [5] Weeks, K.S. and D.W.G. Sears, *Chemical and physical studies of type 3 chondrites--V: The enstatite chondrites.* Geochimica et Cosmochimica Acta, 1985. **49**(7): p. 1525-1536.