HgS, Hg METAL, Cu_2S AND NATIVE Cu IN OPAQUE ASSEMBLAGES IN A PRIMITIVE H3 CHONDRITE: NOVEL CONSTRAINTS FOR EARLY SOLAR SYSTEM CONDENSATION AND ACCRETION EPISODES.

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Introduction: The discovery of rare tiny Hg-Cu-bearing sulfides associated with Cu and Hg metal in opaque assemblages [1] in Tieschitz chondrite indicates equilibration at low temperatures (<< 300°C) [2,3]. These volatile-rich minerals represent a unique case to decipher early condensation processes in the nebula and check for element mobility in parent body [4]. FESEM of LN_2 cooled uncoated samples at low vacuum and HRTEM observations negates that native Cu formed by exsolution from Cu-depleted metal (< 30 ppm) by shock [5]. We suggest that native Cu is one of the initial host phases for native Hg and perhaps other volatile elements during condensation episodes. Hg isotopic analysis are in progress.

Results: µm to nm-size metacinnabar (grey in reflected light), Cu_2S (or either $Cu_{1.97}S$, Cu_9S_5) and metallic Hg spherules are almost systematically found adjacent to native Cu, around or within native Cu. Delicate rhythmic layering of HgS and Cu_2S are in part encountered interstitially between polycrystalline FeS or silicates aggregates next to opaque chondrule-like objects. Native Cu grains (few µm up to 30µm) consist of an aggregate of sub-micron Cu crystallites. TEM-FIB study shows that native Cu also occurs as nm-sized grains within Hg-Cu-bearing sulfides. Many nm-HgS crystals occur within Cu_2S. Concentration profiles in the FeNi metal next to native Cu reveal no enrichment in Cu at the border. Laser ablation ICP-MS analyses of metal and troilite indicate that the troilite aggregates are one host of Cd, Tl, and Hg, and a super-chondritic abundance of Hg is indicated.

Conclusions : Two Hg-rich phases occur in Tieschitz meteorite : HgS and Hg metal globules. Hg is systematically coexisting with native Cu. Nm-sized single crystals of native Cu, tiny globules of Hg, Cu_2S, and the intimate intergrowth with HgS, clearly demonstrate cold accretion of previously condensed particles as fine-grained dust at very low temperatures with no subsequent heating. The preservation of fragile textures, the lack of sublimation of Hg or decomposition of HgS, the absence of finely spaced twin lamellae //(10-21) in troilite unambiguously refute a shock mechanism for the formation of native Cu as claimed by [5] or/and Cu-Hg assemblages. Cu-content in Tieschitz FeNi is too low to allow exsolution of Cu either by shock-heating or post-shock cooling.

References: [1] Caillet Komorowski C. et al. 2009. *Meteoritics & Planetary Science* 44:A112, [2] Potter R.W. and Barnes H.L. 1978. *American Mineralogist, 63:1143-1152.* [3] Ollitrault-Fichet R. et al. 1984. *Journal of Less Common Metals*. 96:49-62. [4] Reed G.W. Jr. 2000. *Meteoritics & Planetary Science*, 35:A133-A134. [5] Rubin, 1994. *Meteoritics*, 29:93-98.