PETROLOGY OF RARE MELT-TEXTURED, METAL-POOR CLASTS IN LL6 CHONDRITE BRECCIA NORTHWEST AFRICA 10565. S. M. Kuehner[1], A. J. Irving[1,2], P. P. Sipiera[2] and A. Jonikas [1]Dept. of Earth & Space Sciences, University of Washington, Seattle, WA 98195, USA (irvingaj@uw.edu), [2]Planetary Studies Foundation, Galena, IL, USA.

Introduction: In the course of cutting slices from 608 gram LL6 chondrite breccia Northwest Africa 10565, one of us (AJ) discovered several unusual fine-grained clasts. The largest slice containing such clasts was acquired by the Planetary Studies Foundation for detailed characterization. The entire 7 cm by 5.2 cm slice was polished, carbon-coated and surveyed with back-scattered electron imagery in the University of Washington electron microprobe instrument.

The specimen consists mainly of angular LL6 chondrite clasts (containing rare remnant, relatively large chondrules) in a finer grained recrystallized matrix. Olivine ($Fa_{29.0-32.6}$), orthopyroxene ($Fs_{23.4-23.5}Wo_{1.6-1.5}$) and clinopyroxene ($Fs_{9.5-9.9}Wo_{43.8-43.3}$) have compositions within the typical range for equilibrated LL chondrites, and occur with accessory sodic plagioclase, chromite, kamacite, taenite, merrillite and troilite.

Figure 1. *Entire Northwest Africa 10565 slice, showing the two largest rounded, fine grained, melt-textured clasts (A bottom left, B bottom center).*

Clast A: One unusual clast consists mainly of euhedral, bipyramidal olivine grains with very magnesian cores ($Fa_{13.8-14.0}$) and uniform, thin ferroan rims ($Fa_{29.6}$) in a fine grained mesostasis of acicular clinopyroxene and glass with rare troilite and kamacite (Figure 2A). A few lithic clasts are present and also shreds of metal, which are typical features of impact melted ordinary chondrites.

Clast B: Another unusual clast consists of equilibrated, anhedral olivine grains ($Fa_{27.3}$), chromite, troilite and minor taenite in a fine grained mesostasis of skeletal pyroxenes plus glass (Figure 2B). Both clinopyroxene and orthopyroxene occur in the mesostasis, but not elsewhere.

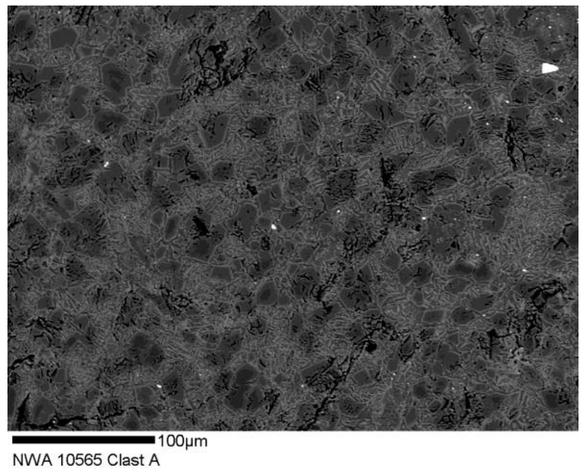
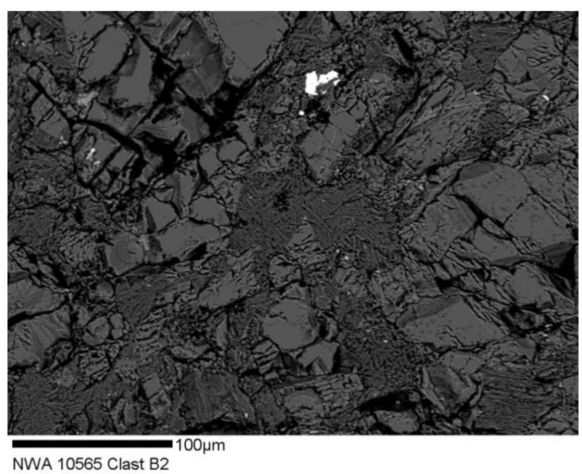


Figure 2. *BSE images of Clast A (**above**) and Clast B (**below**). Note the paucity of metal (bright) in both clasts, euhedral magnesian olivine grains in the quenched matrix in Clast A, and homogeneous more ferroan olivine grains in quenched matrix in Clast B.*



Discussion: The two clasts described here are unusual not only in having melt textures indicative of rapid (quench) cooling, but in containing far less metal than even the LL6 chondrite breccia host.

Although the olivine in clast B has a similar composition to that in the surrounding host clasts (and thus apparently has some affinities to LL chondrites), the mean olivine composition in clast A is far more magnesian (estimated by quantitative mapping from back-scattered electron imagery to be about Fa_{16}). Although the latter composition is more in keeping with olivine compositions in equilibrated H chondrites, the marked paucity of metal seems to preclude any affinity to H chondrites.

We do not consider either clast to be a gigantic chondrule, nor do these clasts share any similarity to the “chimeric” clast described by [1] in LL3 chondrite breccia Northwest Africa 10214. It is possible that Clast A in particular may be exotic to the LL chondrite parent body, and if so could represent a sample from a previously unrecognized, metal-poor chondrite class (or possibly have some affinity with other metal-poor chondrites described by [2, 3]). In this regard we note the recognition of other low-FeO “ordinary” chondrites, including Yamato 982717, LaPaz Icefield 04757 and Burnwell [4]. Oxygen isotope and other analyses are planned to test these ideas.

References: [1] Rubin A. et al. 2016 *Lunar Planet. Sci.* **XLVII**, #1048 [2] Rumble D. et al. 2007 *Lunar Planet. Sci.* **XXXVIII**, #2230 [3] Bunch T. et al. 2010 *Lunar Planet. Sci.* **XLI**, #1280 [4] Yamaguchi A. et al. 2015 *Lunar Planet. Sci.* **XLVI**, #1679.