PETROLOGIC AND O-Cr ISOTOPIC CHARACTERIZATION OF UNGROUPED METACHONDRITE NORTHWEST AFRICA 10503: CLUES TO A NEW CARBONACEOUS CHONDRITIC PARENT BODY.

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Introduction: An unusual achondrite purchased by one of us (FK) from a dealer in Zagora, Morocco in 2015 is a unique recrystallized specimen with affinities to carbonaceous chondrites, but with oxygen and chromium isotopic compositions unlike those for any known meteorite classes. In some ways Northwest Africa 10503 is reminiscent of CV7 chondrite Northwest Africa 3133, CO7 chondrite Northwest Africa 1869, and unique achondrites Northwest Africa 2788 and Northwest Africa 7822, which we have characterized previously [1, 2, 3, 4]. Like Northwest Africa 2788, this latest specimen provides evidence for the existence of a previously unrecognized carbonaceous chondritic parent body, for which no known chondrule-bearing representatives have thus far been recovered or described.

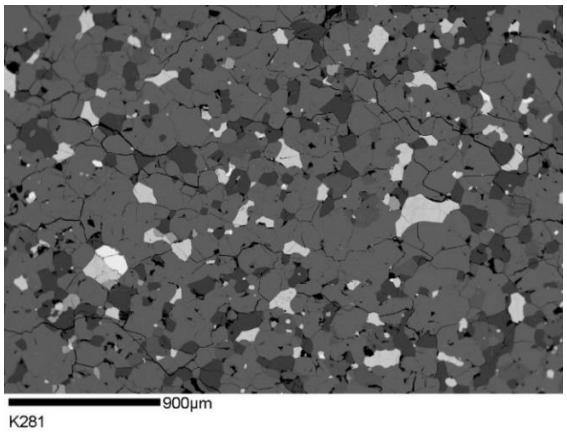

Figure 1. Back-scattered electron image. Olivine (medium gray), cpx (darker gray), plagioclase (darkest gray), chromite (light gray), sulfides (lightest gray), taenite (brightest).

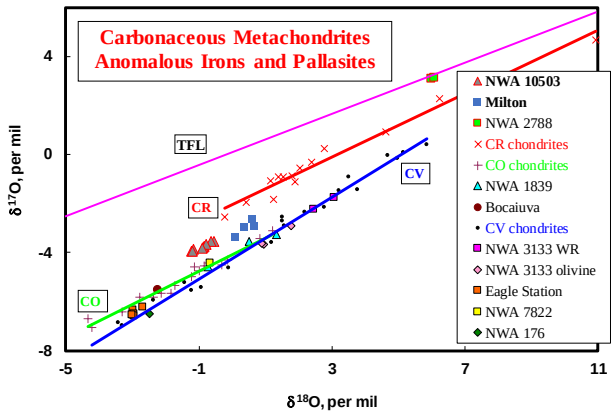

Figure 2. Oxygen isotope plot for carbonaceous metachondrites, anomalous irons and pallasites. Note that the data for NWA 10503 and Milton plot *between* and parallel to the trends for CR and CV/CO chondrites.

Petrography and Isotopic Compositions: The very fresh specimen has a triple grain junction texture (see Figure 1) with grainsize of 0.1-0.7 mm. It is composed predominantly of olivine ($Fa_{31.8-32.0}$, FeO/MnO = 79-96) with subordinate clinopyroxene (~20 vol.%; $Fs_{11.4-11.6}Wo_{42.5-42.6}$, FeO/MnO = 43-44), intermediate plagioclase (~10 vol.%; $An_{32.3-33.9}Or_{3.2-3.0}$), and accessory pyrrhotite, chromite, taenite and pentlandite. Analyses of nine acid-washed subsamples by laser fluorination gave, respectively, $\delta^{17}O$ -3.757, -3.884, - 3.950, -3.557, -3.569, -3.779, -3.674, -3.818, -3.968; $\delta^{18}O$ -0.848, -1.162, -1.212, -0.555, -0.624, -0.873, -0.792, -0.893, -1.206; $\Delta^{17}O$ -3.309, -3.270, -3.310, -3.264, -3.240, -3.318, -3.256, -3.346, -3.331 per mil. Analyses of ^{54}Cr are in progress at UC Davis and will be presented.

Although the oxygen isotopic composition of NWA 10503 is in the vicinity of fields for CV and CO chondrites, it is clearly offset to higher $\Delta^{17}O$ values (see Figure 2), and in fact there are no known analyzed meteorites with this particular isotopic composition. The anomalous pallasite Milton has an oxygen isotopic composition ([5] and D. Rumble unpubl. data) which plots on the same trend (see Figure 2), and although there is no other evidence to suggest a genetic relationship with Northwest Africa 10503, both specimens might well derive from the same parent body.

Discussion: The elevated FeO/MnO ratios in constituent olivine and pyroxene in all of the recrystallized specimens discussed here are consistent with precursor chondritic parentage among carbonaceous rather than ordinary chondrites. A concerted effort should be made to find examples of chondrule-bearing relatives for NWA 2788 and NWA 10503.

References: [1] Irving A. J. *et al.* (2004) *EOS, Trans. AGU*, #P31C-02; Schönbeck T. *et al.* (2006) *Lunar Planet. Sci.* **XXXVII**, #1550. [2] Bunch T. E. *et al.* (2006) *EOS, Trans. AGU*, #P51E-1246. [3] Kuehner S. M. *et al.* (2013) *76th Meteorit. Soc. Mtg.*, #5269. [4] Sanborn M. E. *et al.* (2014) *Lunar Planet. Sci.* **XLVI**, #2259. [5] Jones R. H. *et al.* (2003) *Lunar Planet. Sci.* **XXXIV**, #1683.