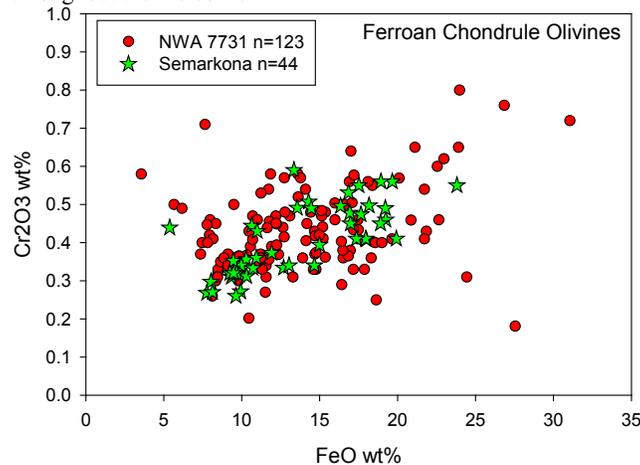


**NEW PRIMITIVE ORDINARY CHONDRITE:  
NORTHWEST AFRICA 7731 (L3.00).**

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**Introduction:** NWA 7731 is an 81 gram, single stone, purchased in Morocco by Aziz Habibi and Adam Bates in 2012. It has black, lightly weathered, fusion crust; saw-cut reveals densely packed chondrules of variable size set in a brown matrix. Preliminary measurement of apparent chondrule size gives median and mean values of 500  $\mu\text{m}$  and 560  $\mu\text{m}$  respectively ( $n=60$ ). Backscatter electron imaging shows that many chondrules contain igneous-zoned porphyritic olivines and mesostasis; there is also abundant fine-grained opaque matrix throughout the meteorite.



**Petrography and Geochemistry:** We performed 123 electron microprobe analyses on a random sampling of individual coarse ferroan chondrule olivines which gave mean values  $\text{Fa}15.0 \pm 5.7$ ,  $\text{Fe}/\text{Mn}=42 \pm 13$ ,  $\text{Cr}_2\text{O}_3=0.43 \pm 0.11\text{wt}\%$ . This high mean  $\text{Cr}_2\text{O}_3$  content combined with relatively low standard deviation is consistent with petrologic type 3.00 based on the Grossman & Brearley [1] subdivisions within type 3.0-3.2 ordinary chondrites. Preliminary x-ray element mapping shows igneous zoning of Cr in olivine (core to rim) which correlates with Fe, similar to that seen in Semarkona (LL3.00). X-ray maps also revealed sulfur-rich opaque matrix in NWA 7731 another hallmark of the most primitive petrologic grade in type 3 chondrites. Although there is no textural evidence of significant brecciation or multiple lithologies in NWA 7731, we did encounter an anomalous chondrule with carbonaceous chondrite-like olivine  $\text{Fe}/\text{Mn}=95$  and higher type-3  $\text{Cr}_2\text{O}_3=0.07\text{wt}\%$ .

**Comparison with Semarkona (LL3.00):** We also carried out 44 electron microprobe analyses on ferroan chondrule olivines in a sample of Semarkona from the UNM collection to compare with our results for NWA 7731, using the same probe conditions. Results for Semarkona:  $\text{Fa}14.5 \pm 4.9$ ,  $\text{Fe}/\text{Mn}=45 \pm 14$ ,  $\text{Cr}_2\text{O}_3=0.41 \pm 0.09\text{wt}\%$ . The figure illustrates the striking similarity between the compositions of Semarkona and NWA 7731 ferroan olivines. We plan to perform further comparisons of matrix and mesostasis with Semarkona, although Cr-content of olivine is likely the most reliable measure of petrologic 3-type for desert meteorites.

**References:** [1] Grossman J. N. and Brearley A. J. 2005. *Meteoritics & Planetary Science* 40:87–122.