DIVERSITY AMONG EH CHONDRITES: ANOMALOUS EH3 CHONDRITE NORTHWEST AFRICA 8789 AND RARE EH MELT ROCKS NORTHWEST AFRICA 7324 AND NORTHWEST AFRICA 10237.

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Introduction: Among enstatite chondrites, EL specimens are represented more abundantly in our collections than EH specimens, and EH chondrites that have been almost completely shock-melted were unknown until the two specimens described here came to light. The major mineralogical differences between EL and EH chondrites [1, 2] are the presence of niningerite rather than alabandite in EH specimens and the elevated silicon content in constituent kamacite in EH specimens (>1.8 wt.%, versus <1.7 wt.% in EL specimens). EH chondrites typically have higher contents of both metal and sulfides than EL chondrites, and emit strong ("stinky") sulfurous fumes when cut.

Suessite-bearing EH3 chondrite Northwest Africa 8789: Small, well-formed chondrules (0.6 ± 0.4 mm, one 2.1 mm) are set in a red-brown matrix (~30 vol.%). Minerals are orthopyroxene ($Fs_{0.2\text{-}15.2}Wo_{0.0\text{-}1.5}$, N = 18), silica polymorph (with enstatite in chondrules), albite, intermediate plagioclase, altered kamacite (Si 3.1 wt.%, Ni 2.7 wt.%, Co 0.5 wt.%), schreibersite, suessite (Ni 80.7 wt.%, Si 14.8 wt.%, Fe 4.1 wt.%, Co <0.1 wt.%), troilite, gypsum (as "mothy" grains, presumably after primary oldhamite) and rare forsterite ($Fa_{0.2}$). This is the first reported occurrence of suessite in an enstatite chondrite; the relatively high proportion of matrix also renders NWA 8789 anomalous.

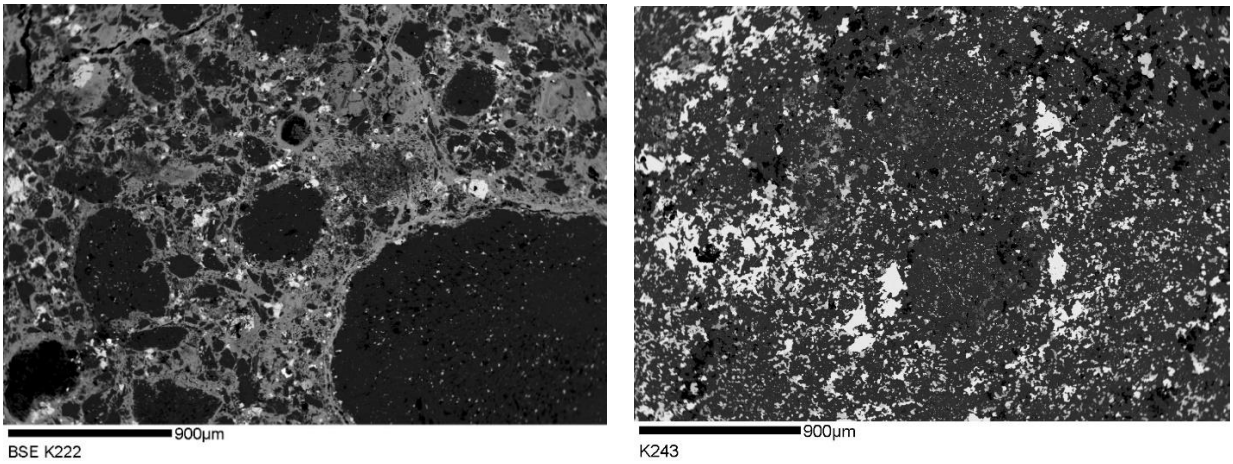

Figure 1. Back-scattered electron images. **A**. EH3 chondrite Northwest Africa 8789. **B**. EH melt rock Northwest Africa 10237. Enstatite (darkest gray), metal and sulfides (bright); medium gray represents iron hydroxides after primary metal in NWA 8789.

EH melt rocks Northwest Africa 7324 and 10237: These two distinct specimens are fine grained aggregates of highly magnesian silicates with abundant metal and sulfides. Minerals are enstatite ($Fs_{0.4\text{-}3.9}Wo_{0.3\text{-}0.9}$), rare forsterite ($Fa_{0.5}$), ragged grains of Si-bearing metal (Si = 2.5 wt.%, Ni = 6.3-6.7 wt.%, Co 0.4 wt.%), Cr-bearing troilite, niningerite, minor oldhamite and rare euhedral graphite laths. Portions of the matrix of NWA 7324 consist of Si-rich glass (K-bearing) containing tiny crystals of a very Si-rich mineral (silica or possibly sinoite), and a few relict chondrules were observed. NWA 10237 has regions composed of tiny enstatite prisms in Na-Al-Si-rich glass.

Concluding remarks: It has been assumed by most workers that EL and EH chondrites derive from separate parent bodies, although this is not universally accepted. Until more EH specimens are recovered and analyzed, this may remain an open question. However, with the discovery of highly shocked impact melt rocks related to EH chondrites, we can now infer that both EL and EH chondrite precursors locally experienced intense shock effects.

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References: [1] Keil K. (1968) *Journal of Geophysical Research* **338**, 6945-6976. [2] Weisberg M. and Kimura M. (2012) *Chemie der Erde* **72**, 101-115.