NORTHWEST AFRICA 11253: A VESICULAR, MELT-TEXTURED METAL-POOR ACHONDRITE WITH MINERALOGICAL AND OXYGEN ISOTOPIC AFFINITIES TO L CHONDRITES

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A 40 gram specimen recovered in northwest Africa was recognized by one of us (AJ) as a peculiar melt-textured achondrite with prominent small vesicles and very sparse subspherical grains of metal. The texture is mostly equigranular (grainsize 0.1-0.4 mm) with some larger prismatic grains. The major phases are olivine ($Fa_{25.2\text{-}25.6}$, FeO/MnO = 47-50), low-Ca pyroxene ($Fs_{20.7\text{-}20.9}Wo_{4.5\text{-}4.4}$, FeO/MnO = 32-35), high-Ca pyroxene ($Fs_{10.9\text{-}11.5}Wo_{38.8\text{-}36.8}$, FeO/MnO = 26-30) and oligoclase ($An_{10.1\text{-}13.7Or5.0\text{-}2.9}$), with accessory chromite, merrillite, chlorapatite, troilite and minor stained kamacite. Although the mineralogy has close similarities to that in equilibrated L chondrites, significant differences are the very low abundance of metal (overall <0.5 vol.%) and the presence of fine exsolution lamellae in pyroxenes.

Oxygen isotopes determined on acid-washed subsamples by laser fluorination are, respectively $\delta^{17}O$ 3.843, 4.145, 4.029; $\delta^{18}O$ 5.192, 5.734, 5.524; $\Delta^{17}O$ 1.102, 1.117, 1.112 per mil, and plot within the field for L chondrites. It is possible that NWA 11253 could be a product of impact-induced melting (or alternatively perhaps a product of endogenous magmatism) on the L chondrite parent body. In either hypothesis it is necessary to explain the paucity of metal (perhaps by sinking out from silicate rich melt). The degree of vesiculation is much greater than in typical L melt breccias and L melt rocks, but similar to that in unusual L melt rock Patuxent Range 91501 (e.g., [1, 2]).

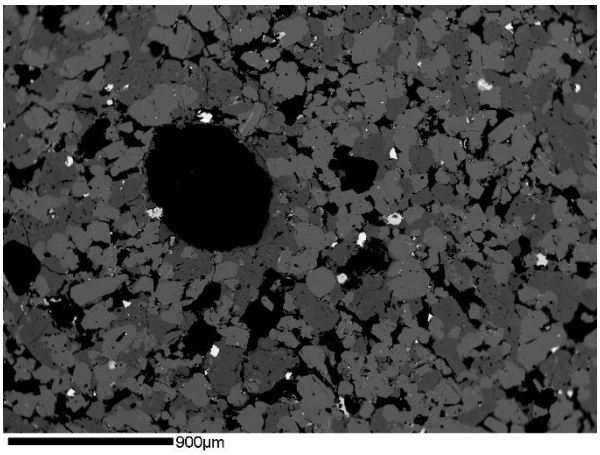

Figure 1. ***A (upper left)***. *Cut NWA 11253 stone (width = 4 cm) showing two very small grains of kamacite (bright).* ***B (upper right)***. *Interior slice showing subspherical kamacite grains and vesicles; orange and dark staining is from terrestrial alteration of metal to hydroxides. Photos by Bob Falls.*
C (lower left). *Back-scattered electron image showing igneous texture and vesicles (black). Olivine is lightest gray, pyroxene is medium gray and plagioclase is darkest gray. All of the small bright grains are either chromite or troilite – there is no metal visible in this image.*

References: [1] Benedix G. K. *et al.* (2003) *Lunar Planet. Sci.* **XXXIV**, #1947. [2] Benedix G. K. (2008) *Geochim. Cosmochim. Acta* **72**, 2417-2428.