ASU-NWA-215(K520)
Fabien Kuntz
TKW 374g

History: Fabien Kuntz purchased the 374.3g sample from a meteorite prospector in Tindouf, Algeria in 2020.

Physical characteristics: Sample has an irregular shape and a dark brown exterior. The cut face shows a crystalline interior crosscut by black veins.

Fig. 1 & 2 Overview photo (F. Kuntz) showing sectioned sample (left); Overview photomicrograph showing shock vein crosscutting crystalline textured sample viewed using plane polarized light (right).

Petrography: Description and classification (A. Love, App) Sample shows poikilitic texture composed of (vol%): 1.5mm (n=12) orthorhombic pyroxene oikocrysts (30), anhedral-subhedral olivine (49) occurring as 76µm (n=11) chadacrysts and 230µm (n=23) phenocrysts and interstitial plagioclase (13). Lath-shaped pyroxenes share a preferred orientation and some are mantled with Ca-rich pyroxene. Vugs and vesicles occur within plagioclase. Chondrules are absent. Additional minerals are: albitic plagioclase with acicular inclusions of pyroxene, rare troilite, Ti-chromite, apatite, FeOH.

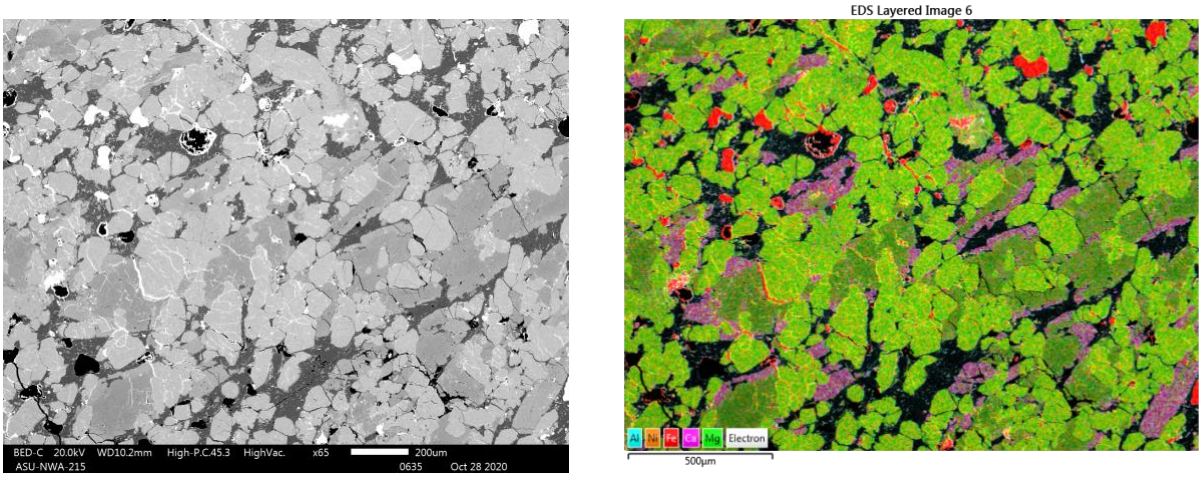


Fig. 3 Backscattered electron image (left) showing poikilitic texture composed of oriented, lath-shaped pyroxenes (medium grey) and subhedral-anhedral olivines (light grey) with interstitial feldspathic (dark grey) material and false-color X-ray map (right) showing: zoned pyroxene oikocrysts (dark green w/ pink rims); olivine chadacrysts and phenocrysts (light green) and interstitial feldspar (dark blue).

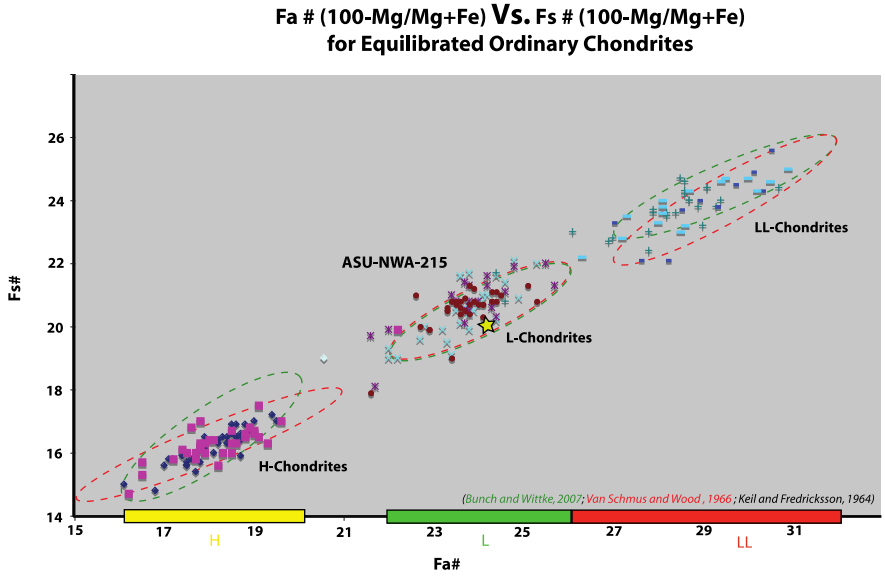
Shock: Sample is crosscut by opaque glassy shock veins and contains glassy melt pockets. Olivine shows mosaic extinction. Some areas of the sample show shock darkening from sulfide veins.

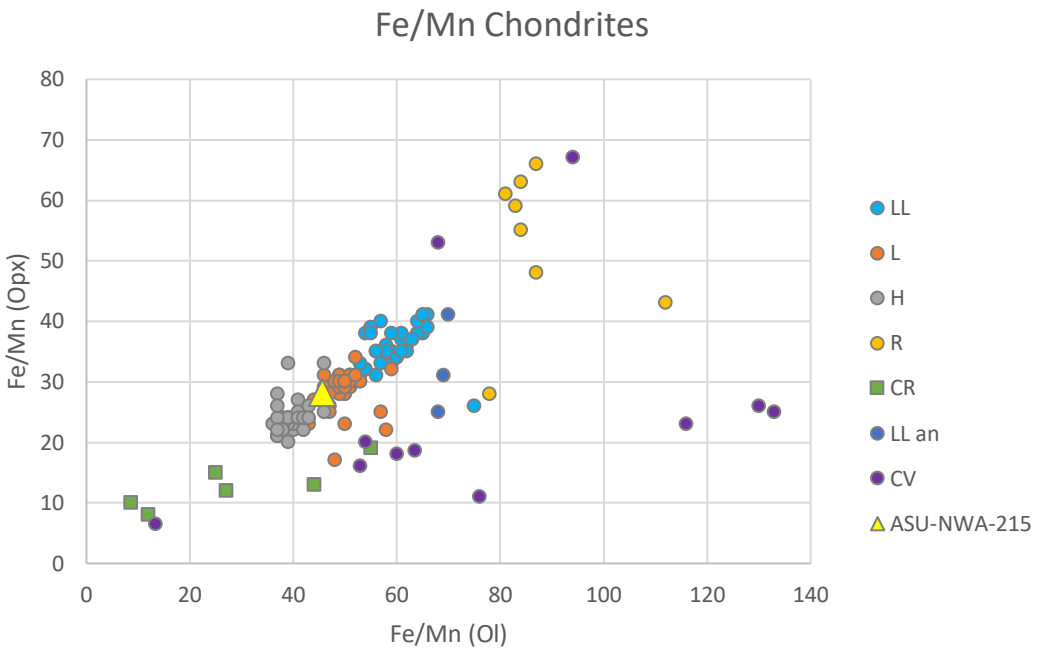
Weathering: Most FeNi metals have weathered to FeOH minerals. Most FeS grains are altered.

Magnetic Susceptibility: Mass magnetic susceptibility was measured using a ZH Instruments SM-30 pocket MS meter. Quadruplicate measurements of the sample produced log χ x 10^{-9} m^3/kg= 4.01. Magnetic susceptibility falls within the range measured for LL chondrites (Rochette et al., 2003).

Geochemistry: (A. Love, App) Geochemistry of sample was measured using the JEOL ITS300 SEM with Oxford XMax EDS in the Dewel Microscopy Lab at Appalachian State University. An accelerating voltage of 20kV was used to analyze 3 spots per grain. Compositions are equilibrated.

Olivine (Fa23.9±0.3, Fe/Mn=45.6±0.7, n=10); low-Ca Pyroxene (Fs20.0±0.8Wo3.9±1.5, Fe/Mn=28.2±0.7, n=12); high-Ca pyroxene (Fs13.1±0.7Wo33.5±2.2, Fe/Mn=22.1±0.6, n=5); plagioclase (Ab85.9±2.2Or3.5±0.6, n=6).





Figs. 3 & 4. Discrimination diagram of ferromagnesian silicates within sample (upper). ASU-NWA-215 plots within field of L chondrites. Fe/Mn ratios of ferromagnesian silicates plot near the field of L chondrites (Rochette et al., 2003).

Oxygen Isotopes: (Karen Ziegler, UNM) analyses of acid-washed subsamples by laser fluorination gave (all per mill): d17O=3.536, 3.786, 3.682; d18O=4.647, 5.172, 4.947; D17O=1.082, 1.055, 1.070.

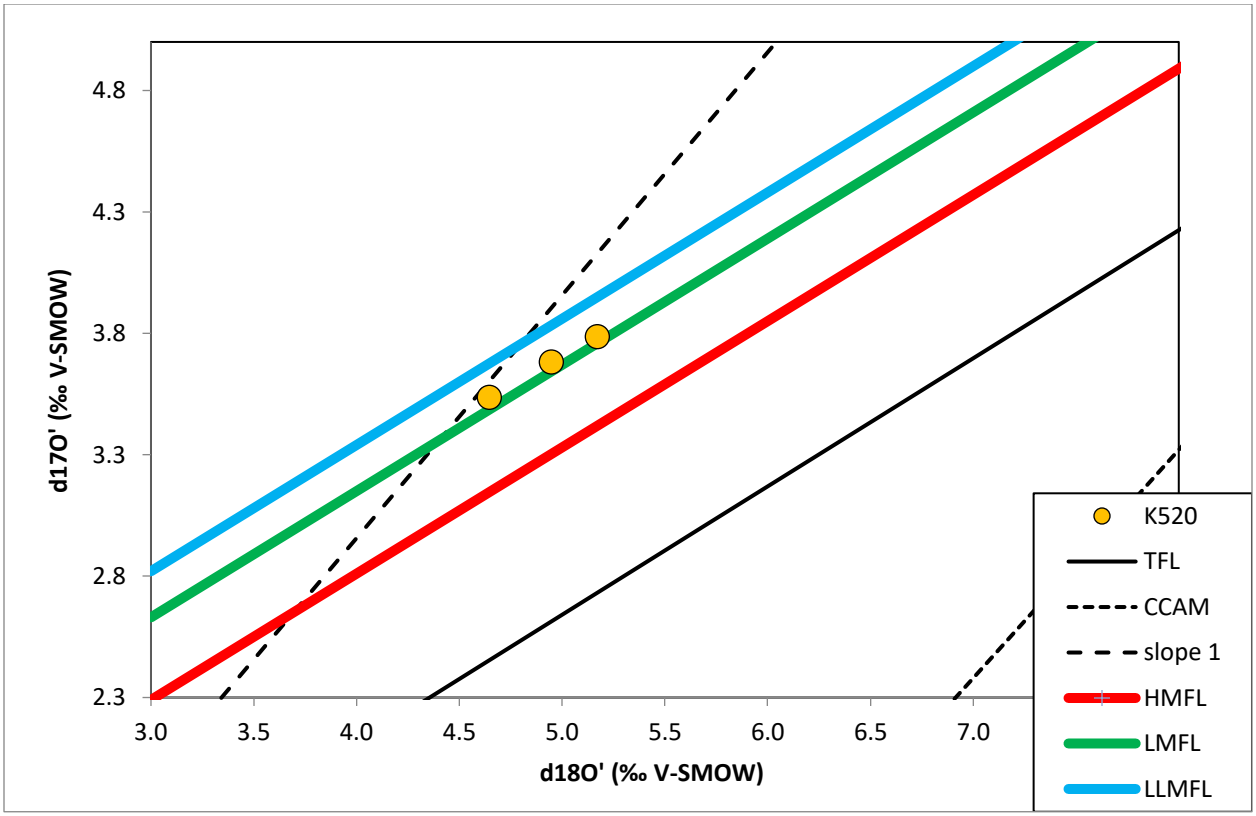


Fig. 5 Oxygen isotope plot showing mass fractionation lines defined by ordinary chondrites. ASU-NWA-215 (K520 - yellow dots) plots in a linear trend parallel to the mass fractionation line for equilibrated L chondrites (Clayton et al., 1991).

Classification: Achondrite (ungrouped) strong shock, moderate weathering. Sample shows cumulate igneous texture, pyroxenes with compositional zoning and has mineralogic and isotopic similarities to L ordinary chondrites.

Samples: Fabien Kuntz holds the main mass. An endcut weighing 32.12g and a polished thin section are on deposit at App.

References: Clayton, R. N., Mayeda, T. K., Goswami, J. N., Olsen, E. J., 1991. Oxygen Isotope studies of ordinary chondrites. Geochemica et Cosmochemica Acta V. 55 pp. 2137-2337.

Rochette, P., Sagnotti, L., Bourot-Denise, M., Consolmagno, G., Folco, L., Gattacceca, Osete,M. L. and Pesonen, L., 2003. Magnetic classification of stony meteorites: 1. Ordinary chondrites. MAPS 38, N.5, pp. 251-268.