Mineralogical and chemical analysis of Rumuruti (R) Chondrite: sample NWA 6145

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Meteorite sample NWA 6145 is classified as a Rumuruti (R) chondrite, a group that does not belong to any major class of chondrite such as ordinary, carbonaceous, or enstatite. R chondrites are characterized by having highly oxidized mineralogy, low chondrule/matrix modal abundance ratio, abundant sulphide minerals (mainly pyrrhotite and pentlandite), and very small amounts of metallic Fe-Ni. R chondrites display a metamorphic grade of 3.6 to 3.9 and shock stages S1 to S4. NWA 6145 is a find that was located in the Sahara of Northwest Africa in November of 2009. The sample is a part slice weighing 3.973g and has dimensions of 21 by 19 by 3 mm and is considered to be one of the freshest samples on Earth.

A characterization of the petrography, mineralogy, and mineral chemistry of NWA 6145 will be performed. Differences in composition between matrix, chondrule, and melt veins will be identified using a false color mineral map of the meteorite section using the Scanning Electron Microscope Mineral Liberation Analysis (SEM/MLA) and electron probe microanalyzer (EPMA). This will be used to define the differences in composition between matrix, chondrule, and melt veins as well as metamorphic grade and shock level of the meteorite.

The U-Pb age and Nd isotopic composition of apatite grains within the meteorite will be evaluated using Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS) measurements. The data will be used to determine the cooling history of the R chondrite parent body, by using the U-Pb apatite ages of NWA 6145. No apatite ages have been reported for R chondrites and this should help constrain the cooling rate. The Nd isotopic measurements of NWA 6145 will be used to confirm that it formed from condensate material similar to that of the chondrite groups.

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