

## **Electron Microprobe and Transmission Electron Microanalysis of Iddingsite Alteration in Martian Meteorite Northwest Africa 10416**

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Martian meteorite Northwest Africa (NWA) 10416 is an olivine phyric basalt with 1-2 mm wide olivine megacrysts which show at least two phases of alteration. Electron backscatter images and qualitative and quantitative elemental X-ray maps, using a JEOL 8200 Superprobe at the University of New Mexico, were created to better understand the nature of this alteration. The grains have altered to orange iddingsite, a hydrous deuteric alteration phase of olivine. The iddingsite grains are rimmed by pristine olivine, indicating that the alteration must have occurred before the magma or lava fully solidified.

Within the orange iddingsite cores are brown 'altered iddingsite' areas which are porous and heavily depleted in Si and Mg and enriched in Fe. These cores appeared to be multi-phased and displayed a complex nanocrystalline structure, so  $20 \times 10 \mu\text{m}$  sections of this material were extracted via focused ion beam using the Quanta FEG/FIB at UNM. These sections were examined using the Gatan 2010 and 2010F transmission electron microscopes, also at UNM. High resolution imagery and energy-dispersive spectroscopy revealed the presence of crystalline oxides, most likely ferrihydrite, along with an amorphous "silica gel." Whether this further alteration is Martian or terrestrial remains to be seen and will require further analysis.