REFLECTANCE SPECTRA OF WET-HEATED C3.0-UNGROUPED CHWICHIYA 002. S. Sidhu¹, D. Applin¹ and E.A. Cloutis¹. ¹Centre for Terrestrial and Planetary Exploration, 515 Portage Avenue, R3B 2E9, Winnipeg, Manitoba, Canada, sidhu-s13@webmail.uwinnipeg.ca.

Introduction: Carbonaceous chondrites (CCs) provide a unique window into studying the history of the solar system as they can provide insights into early Solar System conditions [1]. CCs have also been suggested as delivering organics to the early Earth [2]. However, several CCs display evidence of thermal and aqueous alteration [3, 4]. Several classification systems have been developed over the years that allow us to characterize CCs based on their degree of aqueous alteration and thermal metamorphism [1]. Starting at a petrological grade of 3, decreasing grade, i.e., 3 → 2 → 1 signifies increasing aqueous alteration, whereas increasing grade, i.e., 3 → 4 → 5 → 6 signifies increasing thermal metamorphism [1]. The most pristine CCs are classified as C3.0 or C3.00 and show scant evidence of alteration [1].

Chwichiya 002 is classified as a C3.0-ungrouped meteorite and contains large chondrules and minimal hydrous phases [7]. It contains abundant fine-grained iron-rich matrix (74 vo.%) and no hydrated phases. In this study, we discuss preliminary results of a study conducted on heating Chwichiya 002 and observing any spectral changes.

Methods: We subjected ~ 1 g of powdered (<125 μm) of Chwichiya 002 to wet heating with ~ 1 mL of reverse-osmosis water. The sample was sealed in a sealed pressure vessel system using a Teflon-lined Parr bomb (Model 4749 Parr Instrument Company). The sample was packed in an argon-purged glove box and heated in a vacuum oven (model VBF-1200x-H8), maintained at 200°C for 7 days.

After the heating, the sample (still in the pressure vessel) was left to cool to room temperature to avoid thermal emission during data collection. Spectral reflectance data were collected using an Analytical Spectral Devices (ASD) LabSpec 4 Hi-Res spectrometer with a spectral resolution between 2 and 6 nm. Spectral data were collected between 350 to 2500 nm, and the spectra were averaged over 500 scans, for sample, reflectance standard and dark current. Data were collected at a viewing geometry of i = 30° and e = 0° with incident light being provided by an in-house 150 W quartz-tungsten-halogen collimated light source. The spectra were measured relative to a Fluorilon 99% diffuse reflectance standard and corrected for minor absorption bands in Fluorilon and for dark current.

Results: The pre-heated spectrum of Chwichiya 002 displays a reflectance drop-off below ~ 700 nm, and a broad weak absorption feature centered around ~ 1200 nm. The spectrum above ~1500 nm displays a red slope. This is consistent with its generally amorphous, phyllosilicate-free composition.

The spectrum after heating displays a pronounced reflectance hump at ~ 700 nm, reaching a reflectance maximum of ~ 0.068. The post-heating spectrum also displays a much broader and deeper absorption feature centered near 1300 nm. Within the broad absorption band, slight features at ~ 800 and ~ 1900 nm are discernable.

Discussion: Our pre-heating spectrum is consistent with the results shown in [8] that also show a slight absorption feature at ~ 1000 nm and decreasing albedo shortward of ~ 500 nm. It is clear from the post-heating spectrum that Chwichiya 002 likely oxidized into hematite, as indicated by the presence of Fe³⁺-oxyhydroxide related features: i.e., the steep reflectance drop-off below ~700 nm and an absorption feature near 800 nm. The absorption band seen at ~ 1900 nm indicates some H₂O/OH.

![Figure 1: VIS/NIR (350-2500 nm) reflectance spectra of Chwichiya 002 before and after heating.](image-url)
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