

In-situ Micro-Raman spectroscopic analysis of Handprints in Maltravieso Cave (Cáceres), Spain

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Maltravieso Cave (Cáceres, Spain) has an important Early Paleolithic Rock Art including an interesting group of handprints. The typology, distribution, techniques and chronological context of the handprints has been studied previously [1]. In this paper we are going to use a non-destructive technique to analyze the mineralogical composition of the base rock and the paintings.

When cave paintings must be analyzed, non-destructive portable instruments are the best option since avoid any contact with the artifacts and thereby prevent any damage. The portable Micro-Raman spectrometer (DeltaNu®) used was an Inspector Raman Delta Nu Raman analyzer that was fitted with a 785 nm diode laser whose maximum output power at the source was 120 mW and a thermoelectrically cooled charge-coupled detector with a range of 200–2000 cm^{-1} . The integration time for recording the spectra was 10 seconds at a resolution of 8 cm^{-1} . In order to increase signal/noise ratio 20 spectra were recorded.

Dolomite ($\text{CaMg}(\text{CO}_3)_2$) is the main composition of the walls of the cave. The rock also has some veins of α -hematite ($\alpha\text{-Fe}_2\text{O}_3$) (Figure 1).

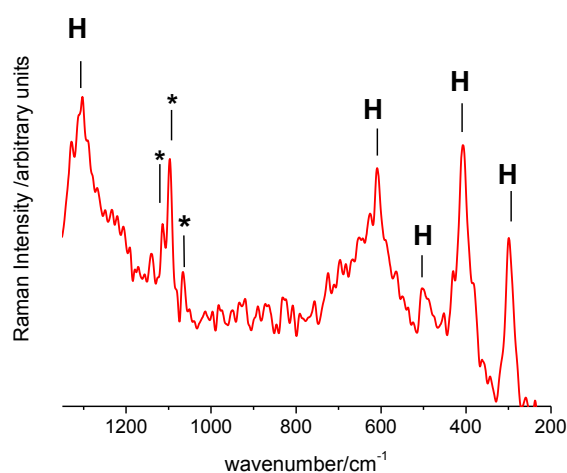


Figure 1.- Raman spectra of the rock vein. H = α -hematite ($\alpha\text{-Fe}_2\text{O}_3$); * signal from the rock wall

The identification of the composition of the handprint is rather difficult since all of them are covered with a layer of calcium carbonate (CaCO_3). However in some points of the red pigment hematite signals have been identified.

[1] H. Collado Giraldo, J.J. García Arranz, IPFRAO 2013 Proceedings, American Indian Rock Art 40, 2013, 383-440