

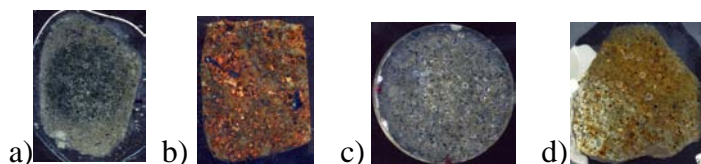
Catodoluminescence and Raman Spectroscopic Characterization of Phosphates in Mexican Chondrites

Introduction

Four chondrite meteorites fallen in Mexico (Nuevo Mercurio, Nuevo Mercurio (c), Cuarta Parte, and Cosina) were studied in polished thin sections, using a secondary electron microscope catodoluminescence system (SEM-CL), and Raman spectroscopy (RS). We analyzed and compared the spectra obtained by CL and RS of merrillite and apatite. These meteorites belong to the collection of Institute of Geology of the University of México.

Meteorite description

- Nuevo Mercurio meteorite, classified as an olivine and bronzite chondrite H5, fell down in december of 1978 near the locality of Nuevo Mercurio, Zacatecas ($24^{\circ} 18' N$ $102^{\circ} 08' W$).
 - Nuevo Mercurio (c) is a genomict breccia H5/6, with the presence of some H6 clasts, a dark inclusion, and a large grain of metal-troilite. The minerals are olivine, pyroxene and feldspars, while the opaque mineral phases are troilite, kamacite, taenite and chromite.
 - Cosina meteorite, classified as a chondrite of olivine and bronzite H5, fell down near Dolores Hidalgo city, Guanajuato ($21^{\circ} 10' N$ $100^{\circ} 52' W$) in january of 1844. It is an unusual ordinary chondrite with a highly porous lithology.
 - Cuarta Parte (also known as Silao) meteorite, classified as an ordinary chondrite L4, fell down in april of 1995 in Silao municipality, Guanajuato ($20^{\circ} 56' N$ $101^{\circ} 21' W$).
- Merrillite and apatite are present as accessory minerals in all meteorites.



Experimental method

The luminescent images showed the occurrence of plagioclases and phosphates. The phosphates CL spectra show the presence of two different profiles which could be assigned to merrillite and apatite, and this assignment was then confirmed by EDS and Raman spectroscopy studies. The CL spectra of merrillites of the four meteorites were very similar, even though they fell very separated in time and place.

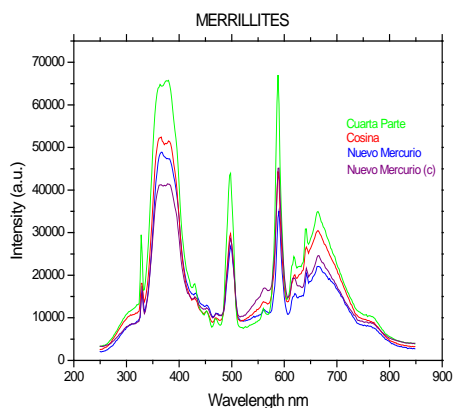


Fig. 1 CL spectra of merrillites

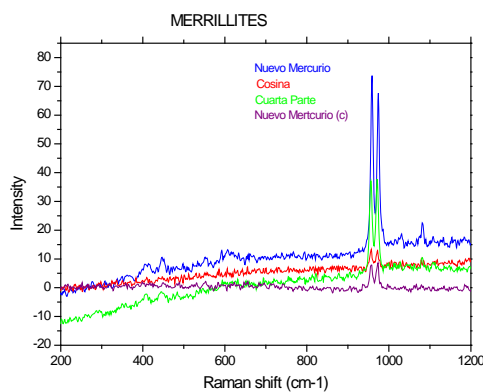


Fig. 2 Raman spectra of the merrillites

Conclusions:

Despite of the differences in mineral composition and texture of the four meteorites, it is remarkable that the merrillite CL spectra are so much alike, indicating the presence of the same RE elements, with similar relative proportions, in all the cases.