SILICA SPECIATION: COUPLING SEM RAMAN AND CATHODOLUMINESCENCE.

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Seifertite, stishovite, cristobalite, tridymite, quartz and high and low pressure glass, are silica phases found in Martian meteorites, eucrites, enstatite chondrites and lunar meteorites. Crystalline state of silica in meteorites and terrestrial rocks essentially depend on the intensity of the shock on the parent body and the chemical composition of the original silica.

Identification of silica phase is important, it allow having information on (P-T) conditions of its formation, especially the intensity of the shock. Cathodoluminescence CL spectroscopy on SEM, allowed to identify most silica phases and to valid the technique, that is simple, rapid, efficient and non destructive. Reference spectra have been collected [1-4].

We perform a Raman spectrometer prototype coupling to SEM and to CL spectrometer. Collecting spectra from a same minerals permit by using both techniques to inter-calibrate the system. The aim is to be able to identify minerals and phases by using one or the other technique or both of them in the same equipment. It is especially important to be able to do it for minerals that are instable and can be destroy by one or the other technique, under the laser or electrons beam.

Raman spectra have been recorded on previously identified phases by CL of silica, plagioclase, maskelynite and pyroxenes; in order to valid this approach by comparing results.

We present here analyses on the lunar meteorite NWA 4734 [5-6], exceptional because the presence of high an low pressure silica phases: stishovite, seifertite, tridymite and cristobalite, and plagioclase and maskelynite [5,7].

We began by the location of interesting phases by SEM images, CL spectra have been collected and the same points have been used to collect Raman spectra on VP Laser 532 mode, 0,2 mV with different counting timing.

Comparing results shows that this new approach seems to be interesting, at least for some minerals and it could be used for meteorites and terrestrial rocks.

References: [1] Chennaoui Aoudjehane H. et al. (2005) MAPS 40, 967-979. [2] Chennaoui Aoudjehane H. et al. (2006) LPSC XXXVII Abstract #1036 [3] Chennaoui Aoudjehane H. et al. (2006) LPSC XXXVII Abstract #1037. [4] Chennaoui Aoudjehane H. et al. (2007) LPSC XXXVIII Abstract #1714 [5] Jambon A. et al. (soumis) [6] Connolly H.C. et al. (2008) MAPS 43, 571–632 [7] Chennaoui Aoudjehane et al (2008). MAPS abstract 5058, July 2008.