CRISTOBALITE AND K-FELDSPAR IN THE NAKHLITE MIL03346: A CATHODOLUMINESCENCE STUDY. H. Chennaoui Aoudjehane[1-2], A. Jambon[2] and O. Boudouma[3], [1]Université Hassan II Aïn Chock, Faculté des Sciences, Equipe Géoressources, BP 5366 Maârif Casablanca Morocco (e-mail : chennaoui_h@yahoo.fr), [2]Université Pierre et Marie Curie-Paris6 Laboratoire MAGIE, Case 110, 4 place Jussieu, 75252 Paris, France (e-mail: jambon@ccr.jussieu.fr), [3]Université Pierre et Marie Curie-Paris6 Service de microscopie électronique à balayage, Case 110, 4 place Jussieu 75252 Paris, France (e-mail: boudouma@ccr.jussieu.fr).

Shock intensity in Martian meteorites has been actively studied in recent years to understand their formation and ejection from their parent body. The analysis of high-pressure phases like stishovite, post-stishovite, majorite, hollandite or maskelynite in shergottites permits to constrain the intensity of the shock between 30 and 90 GPa [1- 4]. Nakhlites are definitely less shocked and none of them contain high-pressure minerals.

Cathodoluminescence (CL) spectroscopy is an easy approach for determining which polymorphs of silica or other silicates are present in thin or polished sections of meteorites [5]. We applied this technique to the determination of silica and feldspar speciation in the nakhlite MIL03346. Notice that a previous CL study of MIL03346, with a comparison to Lafayette, was restricted to imaging [6].

CL images and spectra have been recorded by the cathodoluminescence system in the scanning electron microscope (SEM) of the UPMC (Université Pierre et Marie Curie Paris VI) a detailed description of which can be found in [5].

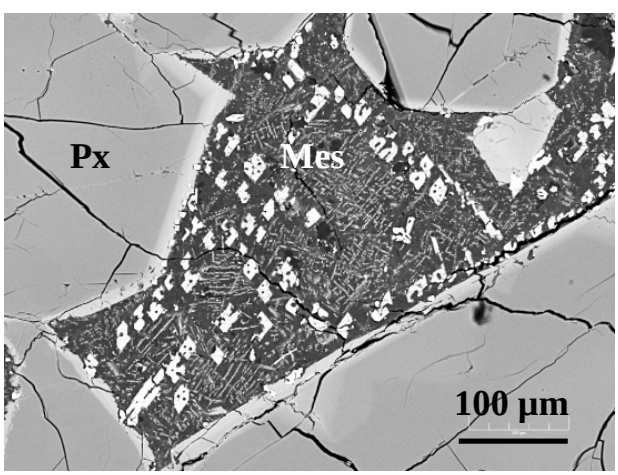

Figure 1: BSE image of the mesostasis of MIL03346 surrounded by fractured pyroxenes (Px).

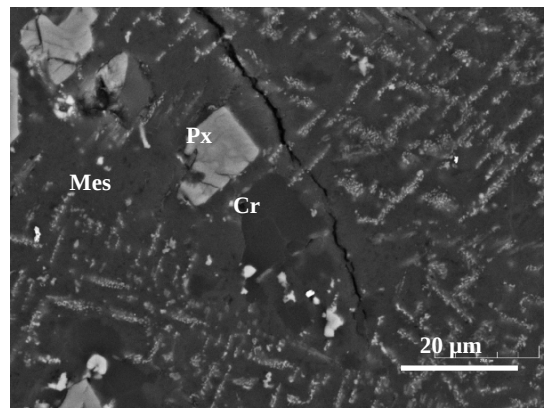

Figure 2: BSE image of the detail in the mesostasis with euhedral cristobalite (Cr), euhedral pyroxene (Px) (light grey), K-FP rich mesostasis and dendritic Fe-Ti oxides

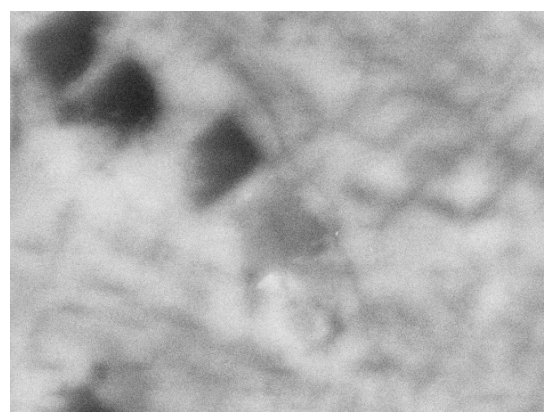

Figure 3: CL image of the same area; the most luminescent background is the K-FP rich mesostasis (Mes), cristobalite less luminescent and not luminescent at all is pyroxene.

Backscattered electron (BSE) images of the mesostasis have been collected first (Fig 1). Mineralogy and texture are in agreement with previous results obtained on different sections [7- 10]. Details of the images show subhedral grains of silica, euhedral grains of pyroxene and dendritic oxides (Fig 2). The strong luminescence of the K-FP irradiates the whole mesostasis, of CL images, hiding the weaker

luminescence of silica (Fig 3). CL Spectra restricted to much smaller areas permit to identify cristobalite with three peaks near 15,900, 19,500 and 26,500 cm^{-1} and K-FP with two peaks near 13,800 and 20,000 cm^{-1} (Fig 4, 5).

The shock intensity in MIL03346 is low in agreement with that of other nakhlites, much weaker in comparison to shergottites. The presence of cristobalite confirms that it is undoubtedly less then 0.1 GPa. Statistical considerations on the number of nakhlites compared to shergottites suggest that either, their number is unreasonably above the statistical expectation or more likely that the shock recorded in shergottites is not related to their ejection from their parent body.

References: [1] Stöffler D. (2000) LPSC **XXXI,** #1170. [2] Malavergne V. et al. (2001) MAPS **36**, 1297-1305. [3] El Goresy A. et al. (2000) Science **288**, 632-634. [4] Beck P. et al. (2005) LPSC. **XXXVI**, #1333. [5] Chennaoui Aoudjehane H. et al. (2005) MAPS **40**, 967-979. [6] Rost D. and Vincenzi E.P (2005) MAPS **40**, A130. [7] McKay G.A. and Schwandt C. (2005) LPSC.**XXXVI**, #2351. [8] Rutherford M.J. et al. (2005) LPSC **XXXVI**, #2233. [9] Stopar J.D. et al. (2005) LPSC **XXXVI**, #1547. [10] Sautter V. et al (2005) MAPS **40**, A134.

Figure 4- CL spectrum of cristobalite in the mesostasis of MIL03346

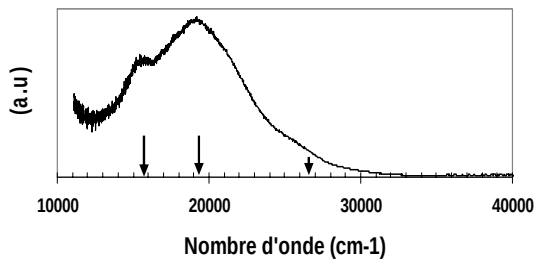

Figure 5- CL spectrum of K-FP in the mesostasis of MIL03346