EFFECTS OF THE TECTONIC STRESS ON LUMINISCENCE OF CERUSSITE $PbCO_3$. E. Crespo-Feo[1], P. Hernandez-Ferreiros[2], J. Garcia-Guinea[2], and V. Correcher[3], [1]Dpt. Cristalografia y Mineralogia. Fac. CC. Geologicas. UCM. C/ Jose Antonio Novais, 2 Madrid 28040 Spain, corresponding autor: ecrespo@geo.ucm.es, [2]Museo Nacional de Ciencias Naturales-CSIC. C/ Jose Gutierrez Abascal, 2 Madrid 28006 Spain, [3]CIEMAT. Av. Complutense 22. Madrid 28040 Spain.

Introduction: Luminescence of cerussite is commonly associated to the Pb^{2+} present in the own mineral structure. Though Pb^{2+} is coordinated with CO_3^{2-}, luminescence features have been assigned to isolated Pb^{2+} ions [1]. Neither impurities nor structural features have been related to luminescence properties of the mineral since the two observed emission bands at ~310 and ~450 nm are generally ascribed to $^3P_{0,1} \rightarrow {}^1S_0$ transition of Pb^{2+} (A-transition) and a higher level transition called D-transition, respectively [2].

Sample and Experimental Procedure: The studied mineral is a cerussite from Mibladen Mine (Morocco). The $PbCO_3$ occurs as a common alteration mineral, disseminated in carbonate rocks heavily faulted and brecciated. Several periods of tensional tectonic processes have affected the rocks containing lead mineralization [3].

Cerussite was characterized by means of X-ray powder difracction (XRD) using a Phillips PW1710/00 difractometer with a CuKa radiation source, equipped with a graphite monochromator. Scanning electron microscope images were obtained by environmental scanning electron microscopy (ESEM) using an Inspect-S of the FEI Company. CL spectra were performed in low vacuum mode without coating, using a Gatan MonoCL3 detector and PA-3 photomultiplier attached to the ESEM. The PMT covers a spectral range of 250 nm–800 nm. The excitation for CL measurements was provided at 30 kV electron beam.

Results and Discussion: CL panchromatic image shows different luminescence areas (Fig.1). An anomalous high emission of light is situated in a small fragment close to a fracture whereas the rest of the surface has a lower intensity. CL spectra of both zones (darker and brighter areas, marked on Fig.1 as points 1 and 2) show the same characteristics (Fig.2). A broad luminescence area can be observed with two different peaks (~440 and ~470 nm), both related to the ~470 nm peak assigned to Pb^{2+} D-transition [2]. A-transition is hardly noticed in our results although a slight peak is detected at ~310 nm (Fig.2).

No different composition occurs in the studied area, then another explanation must be developed for that anomalous luminescence. As it can be seen on the Fig.1, the fissures indicate movements due to, probably, tensional stress. Areas rounded by white circles are also pointing to this hypothesis and the direction of movement is marked by the white arrows. As cerussite hosted-rock is faulted and brecciated due to tectonic strain, it seems that part of the tensional stress has affected the mineral increasing its luminescence.

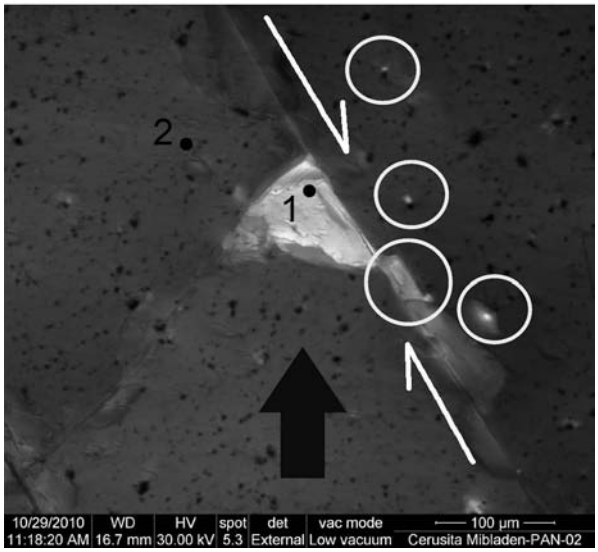

Fig.1. *CL panchromatic image (CL-ESEM). See text for more description.*

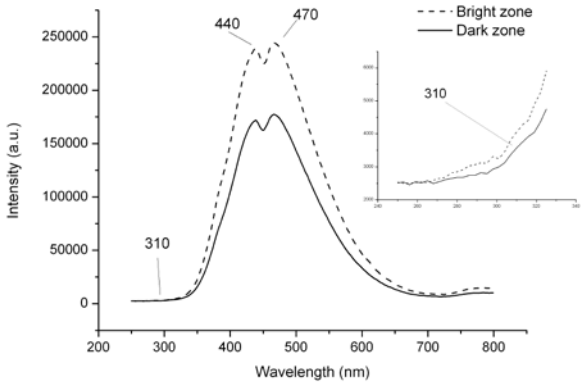

Fig.2. *CL spectra of cerussite from the high luminescence and low luminescence area (points 1 and 2 from the Fig.1, respectively).*

References: [1] Lammers M. J. J. and Blasse G. (1986) *Mat. Res. Bull., 21*, 529-534. [2] Folkerts H. F. and Blasse G. (1996) *J. Chem. Solids, 57*, 303-306. [3] Dagallier G. and Macaudiere J. (1987) *Bull. Soc. Geol. France, 3*, 387-394.