SPECTRA LUMINESCENCE OF URANYL GROUPS ASSOCIATED TO SILICA PHASES IN HYDROTHERMAL AND SEDIMENTARY OPALS FROM MADRID (SPAIN). Pozo, M.[1], Garcia-Guinea, J[2], Furio, M[2]., Fernandez-Cortés, A.[2], Correcher, V.[3] [1]Departamento de Geología y Geoquímica. Universidad Autónoma de Madrid. 28049 Spain. [2]Museo Nacional Ciencias Naturales. CSIC. 28006 Madrid. Spain. [3]CIEMAT. Av. Complutense 22. Madrid 28040, Spain.
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HYDROTHERMAL OPAL.- The late hydrothermal activity occured in the La Cabrera (Madrid) granitic pluton along with miarolitic cavities and pegmatite bodies produced different mineral parageneses linked to the temperature decreasing. The maximun hydrothermal activity ocurred at 250ºC ± 50ºC decreasing up to circa 140ºC. Accordingly, the pegmatitic cavities of the Cabrera granite are zoned from the inner to the outer as follows: (i) calcite with gypsum, opal, uranospinite and johnbaumite in the core, (ii) prehnite, laumontite, heulandite-Ca, stilbite-Ca, chabazite, fluorapophyllite, datolite and bavenite, (iii) epidote, (iv) quartz–feldspar pegmatite being the outer layer of the cavity, and (v) granite as the host rock.

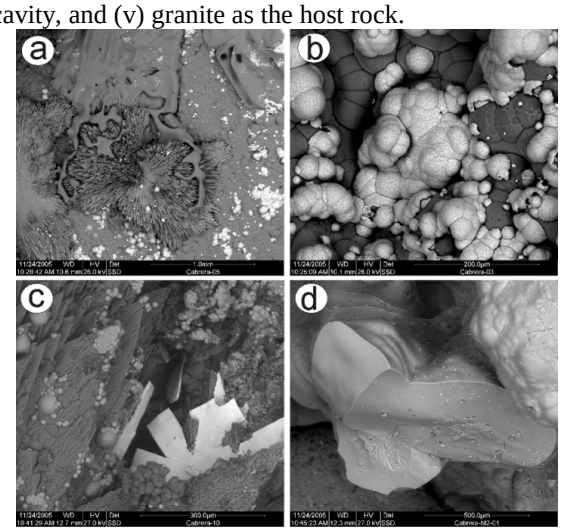


Figure.1.- ESEM pictures of the hydrothermal opal parageneses of La Cabrera (Madrid): (a) Grey background is opal, white sphaeres are johnbaumite, grey needles are calcite and grey masses resembling liquid are gypsum. (b) Black background is opal, white sphaeres are johnbaumite coating opal (c) Uranospinite plates on the former parageneses (d) Broken opal with cavities and aggregate of johnbaumite on the upper right (white).

SEDIMENTARY OPAL.- They are are thin siliceous layers and infills of translucent white colour up to 2 cm thick. The silica phases sporadically occur associated to chert nodules in the sepiolite deposit from the Batallones Butte (Neogene Madrid Basin, Spain). These layers are commonly filling or coating brown silicified sepiolite, being interpreted as a late stage of silicification (Figure 2). XRD analysis indicates opal CT and quartz as main composition with traces of sepiolite. Under the petrographic microscope microcrystalline quarz clusters and cements affecting an opal groundmass have been observed.

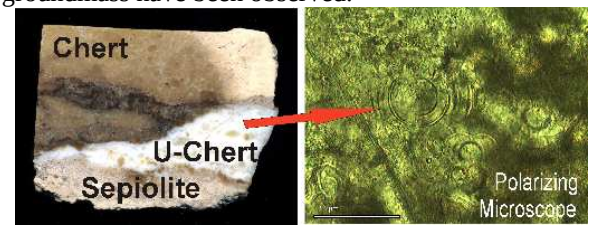
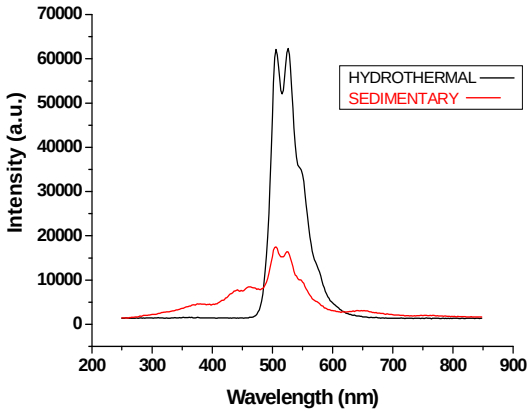


Figure 2. Hand sample and texture in thin section (N//).

The ICP-MS chemical analysis displays high silica content (93.44 wt %), moderate LOI (5.10 wt %) and around 1.5 wt% of other major and trace elements. Among trace elements is noteworthy the U content (69.1 µg/g) higher almost five times its abundance in silicified sepiolite. Other trace elements include V, Cr, Ni, Zn, Rb, Sr, Sb and Ba. Under the ESEM-CL microscope we record a mixed spectra (Figure 3).



Both spectra CL recorded on opal areas clearly depicts close uranyl groups. Moreover, it is important to note that intensities and minor peaks are different. Explanation: in the case of the hydrothermal opal specimen we collected light emission coming from micro-uranospinite crystals hidden in the small vugs, while in the sedimentary case we recorded the characteristic peaks of the quartz and less significant uranyl peaks association which could be attached uranyl groups sited in hydrous cluster of the same opal.