VIGEZZITE AND ASSOCIATED Nb-Ta OXIDES OF EMERALD PEGMATITIC DEPOSITS OF VIGEZZO VALLEY (WESTERN ALPS, ITALY)

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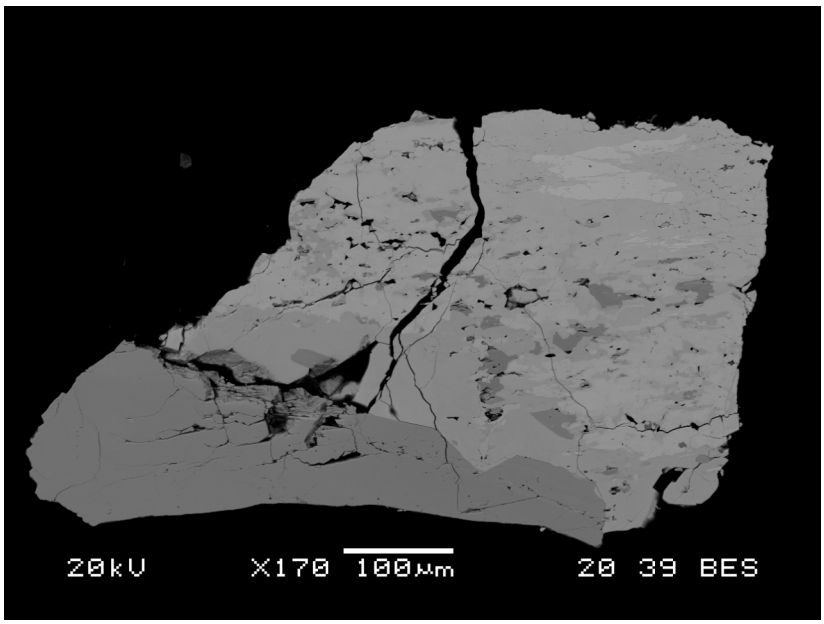
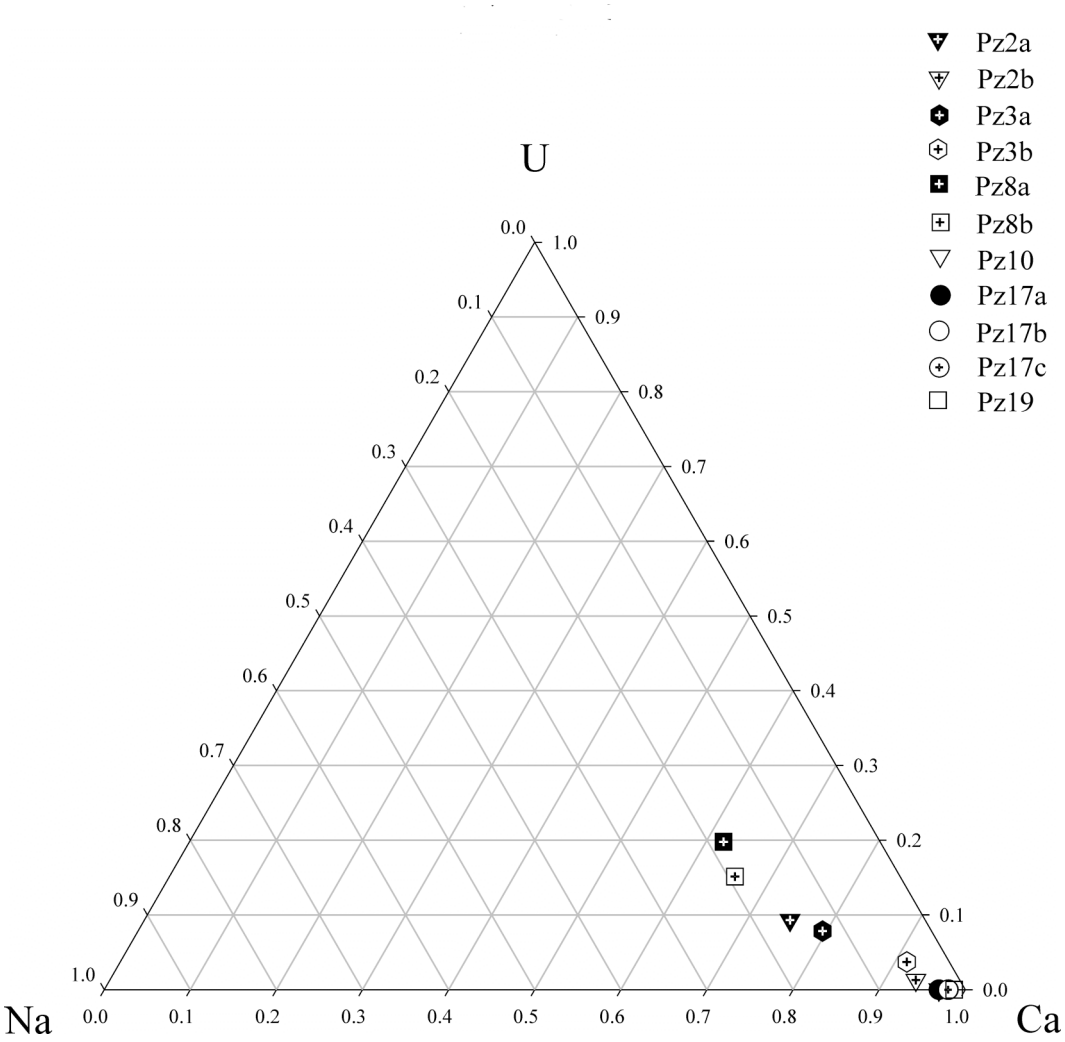
A number of albitized pegmatite dikes of probable Alpine age, cutting ultramafic metamorphic rocks, outcrop in the Vigezzo valley (Western Alps, Italy): these pegmatites are enriched in HFSE, show a moderate degree of geochemical fractionation and contain many rare accessory phases which have been past topics of numerous mineralogical studies. Indeed, more than 60 minerals have been described in these pegmatites including two new species, roggianite and vigezzite, discovered at the Alpe Rosso pegmatite, which is an albitized dike which was deeply mined during the '50s for sodium feldspar. During the quarrying activity, opaque and light green beryl crystals were found. Two other important albitized pegmatitic dikes outcrop at the Pizzo Marcio Mt., one of these is named "Pizzo Marcio North" is famous for having produced gemmy beryls of the emerald variety in the past. Electron microprobe analyses (EMPA) carried out on beryl have revealed high Na_2O and MgO values; the presence of traces of Cr_2O_3 (0.03 wt %) confirm that such crystals can be considered true emeralds. The analyses on brownish-black and dark green-bluish tourmalines in color are "oxydravites" with variable Fe/Mg ratios.

The Nb-Ta oxides, associated with several beryllium silicates (including bavenite, bertrandite, bityite, melinophane milarite, roggianite) and zeolites (like chabazite-Ca, gismondine, phillipsite-Ca, stilbite-Ca and thomsonite), afford an excellent opportunity to study the geochemistry and the complex paragenetic relationships to evaluate the internal evolution of these pegmatitic bodies. Various replacement mechanisms occurred here, involving fersmite, ferrocolumbite, ferrotapiolite, ferrowodginite, manganocolumbite, manganotantalite, microlite, uranoan-microlite, thorian vigezzite and vigezzite.

The analyses of vigezzite revealed the presence of Ce_2O_3 (up to 4.51 wt%), Nd_2O_3 (up to 1.39 wt%), Sm_2O_3 (up to 0.88 wt%) and Gd_2O_3 (up to 0.51 wt %) contents. Unexpectedly high contents of ThO_2 up to 8.65 wt% were also detected in the dark reddish core portions of the crystals analyzed. Vigezzite shows a complex zoning caused by variable Nb_2O_5 contents which range from 27.51 to 36.25 wt%, Ta_2O_5 from 32.60 to 42.04 wt%, CaO from 8.20 to 13.61 wt % and TiO_2 from 6.16 to 10.48 wt%. The compositional range of the fersmites analyzed shows them to be very inhomogenous with Nb_2O_5 from 41.00 to 60.25 wt%, Ta_2O_5 from 25.70 to 43.00 wt%, TiO_2 up 1.69 wt% and detectable Ce_2O_3 contents up to 0.29 wt%. Ferrotapiolite shows Ta_2O_5 contents up to 87.00 wt% and FeO up to 9.00 wt% and ferrowodginite contains high Ta_2O_5 (up to 77.00 wt%) and variable Fe/Mn ratios, in any case with Fe always dominant over Mn.



BSE image showing a complex replacement process involving fersmite (dark grey), microlite (grey), Ta poor manganotantalite (light grey) and Ta rich manganotantalite (white)



Ternary diagram showing representative compositions of microlites from Alpe Rosso and Pizzo Marcio albitized dikes.