

## **Trioctahedral micas in xenoliths from recent volcanism of the Somma-Vesuvius (Italy): crystal chemistry and volcanological inferences**

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A systematic investigation of trioctahedral micas from xenoliths found as ejecta in recent volcanic deposits of the Somma-Vesuvius (Southern Italy) was undertaken to: 1) get the first full crystal chemical characterization of the Vesuvian micas; 2) shed light on the relationship between chemical and structural features of micas and petrogenesis/evolution of their host rocks. Three xenolith types were selected: metamorphic/metasomatic skarns, pyrometamorphic/hydrothermally altered nodules and mafic cumulates. They are associated to three historical eruptions characterized by different magma chemistry and effusive styles: from sub-plinian and most evolved (AD 1631 eruption) to violent strombolian with medium evolution degree (AD 1872 eruption) to vulcanian-effusive, least evolved (AD 1944 eruption) event [1], respectively.

The mica crystals were studied by electron probe microanalysis and single crystal X-ray diffraction, the xenoliths by X-ray fluorescence, inductively-coupled plasma-mass spectrometry, optical microscopy, X-ray powder diffraction, and quantitative energy-dispersive microanalysis.

In a Mg vs Ca (wt%) diagram, only one xenolith sample falls in the skarn compositional field from the Somma-Vesuvius literature [2-4], some fall close to the skarns and cumulate fields, others plot close to the syenite/foidite/essexite field. A subgroup of the selected ejecta does not fall or approach any of the compositional fields.

The Somma-Vesuvius micas of this study can be chemically gathered in three groups: Mg-, Al-rich, low Ti-bearing, low to moderate F-bearing crystals representative of the 1631 eruption (Group 1); Mg-, F-rich and Ti-, Fe-poor micas from the 1872 eruption (Group 2); Ti- and Fe-rich crystals from the 1944 ejecta (Group 3). All micas belong to the 1M polytype and have crystal chemical features consistent with the above subdivision into three groups. Specifically, Group 1 is characterized by *c* parameter  $\sim 10.24$  Å,  $\langle\text{M-O}\rangle$  ( $\sim 2.072$  Å) and  $\langle\text{K-O}\rangle$  ( $\sim 3.168$  Å) distances; Group 2 has the lowest *c* lattice parameter of the whole suite ( $\sim 10.14$  Å),  $\langle\text{M-O}\rangle$  ( $\sim 2.061$  Å) and  $\langle\text{K-O}\rangle$  ( $\sim 3.136$  Å) distances; Group 3 is characterized by *c* lattice parameter,  $\langle\text{M-O}\rangle$  and  $\langle\text{K-O}\rangle$  distances varying in the ranges 10.2261(8)-10.2733(2) Å, 2.061-2.073 Å and 3.160-3.172 Å, respectively. Other structural details [5-6] evidence that Group 3 is the most affected by  $\text{M}^{4+}$ ,  $^{3+}$ -oxy substitution mechanisms; Group 2 are fluorophlogopites; Group 1 is affected, to variable extent, by both oxy-type and  $\text{OH}^- \rightarrow \text{F}^-$  substitutions.

The variability of micas chemical and structural parameters is consistent with the geological history of their host rocks. Particularly, fluorine and water activities seem significant parameters in controlling the overall micas crystal chemistry.

### References

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