New data on rare accessory minerals from alkaline pegmatites of Mount Malosa, Zomba District, Malawi

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The Zomba-Malosa pluton, emplaced approximately 113 Ma, is composed by quartz-syenite and peralkaline granite and belongs to the Chilwa-alkaline province of Cretaceous age (Woolley, 1987; Eby et al., 1995). The associated niobium-yttrium-fluorine (NYF) miarolitic, granitic, alkaline pegmatites are characterized by a unique mineralogy including aegirine, arfvedsonite, cerian pyrochlore, fluorite, hingganite-(Y), Nb-Ta-Y oxides, niobophyllite-astrophyllite, REE-carbonates, several Na-Be-Zr-silicates, xenotime-(Y) and zircon (Guastoni *et al.*, 2003). These pegmatites outcrop close to the summit of Mount Malosa (~2000 m.a.s.l.) and they are subhorizontal, strongly miarolitic and often contain large, metric cavities. The rock textures and the mineral assemblage indicate that these alkaline pegmatites crystallized at shallow depth. Indeed recent structural investigation by single-crystal X-ray diffraction performed on aegirines from Mount Malosa collected in the cavities indicated that the crystallization occurred at ~1kb and at a temperature of 300-400 °C (Secco *et al.*, submitted). In addition, the studies on fluid inclusions in quartz crystals from miarolitic cavities of Mount Malosa estimated entrapment pressure at 130 MPa (Zajacz et al., 2006).

A typical feature of such pegmatites is late-stage replacement processes in miarolitic cavities. Elsewhere, mineral replacements are frequently observed in alkaline pegmatites: for example at the Lovozero Massif and at Mont Saint-Hilaire (Pekov, 2000; Horváth & Gault, 1990). The more common substitutions observed at Mount Malosa are goethite + albite after parisite, quartz after epididymite, quartz + albite after apatite (or milarite) and illite after bastnäsite. Moreover, a number of unknown minerals, usually forming large pluricentimetric euhedral crystals, occur in the cavities and they show replacements by REE-minerals and Zr-Th silicates. Tetrahedral ("pseudoctahedral") pluricentimetric brown crystals of a mineral having the typical crystal morphology of helvite is replaced by quartz + zircon + thorite + subordinate niobian-rutile (Fig.1). Yellow-brownish prismatic, columnar crystals of bastnäsite-(Ce) show a core composed by brown-orange vitreous bastnäsite-(Ce): the remnant portion of the crystals is composed by an earthy, spongy overgrowth of cerianite + bastnäsite-(Ce). Specimens containing replacements after helvite and after bastnäsite-(Ce) were observed together associated with microcline and aegirine in the pegmatite cavities. Another significant pseudomorph is after the tabular, prismatic crystals of niobian-rutile. These crystals show an outer earthy, spongy, brownish rim composed by rhabodphane-(Ce) + minor bastnäsite-(Ce). Internally relics of niobian-rutile are embedded and partially replaced by bastnäsite-(Ce) + cerianite + monazite-(Ce). Locally, submillimetric cerian-pyrochlore and zircon crystals line small secondary vugs of these crystals.

Recent analyses on samples collected at the locality in 2006 allowed the discovery of three new minerals for the locality: cerianite, elpidite and zektzerite. CERIANITE occurs as yellowish masses and crusts as partial pseudomorphs on parisite-(Ce) and bastnaesite-(Ce). ELPIDITE occurs as whitish masses up to 8 cm across composed by groups of large columnar crystals. Elpidite is always partially altered and crystal faces are not well defined. ZEKTZERITE has been found only in 5 specimens. This extremely rare mineral, until now found only at two localities (Washington Pass, Washington, USA, (Dunn et al. 1977) and Dara-I-Pioz Glacier, Tajikistan (Belakowski 1991)), occurs in Mount Malosa in tabular, colorless, gemmy crystals up to 3 cm across associated with microcline, smoky quartz and aegirine.

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