



Geochemistry of sedimentary-derived migmatite from NE Sardinia, Italy

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In NE Sardinia at Porto Ottiolu, about 30 km south of Olbia (NE Sardinia), crops out a sequence of migmatized ortho and paragneiss, belonging to the Variscan basement's axial zone. Sedimentary-derived migmatite, which have a layered appearance in the field, were affected by three major variscan folding phase. D2, which is characterized by tight folds, is the most widespread deformation in the field.

Leucosomes consists of discontinuous centimetre-thick, coarse-grained layers, that follow the S2 schistosity and are folded by D2 deformation phase. The contact with mesosome is sharp and sometimes marked by melanosome trails. They consist of quartz, plagioclase, very rare K-feldspar, muscovite, biotite, fibrolite, and rare kyanite. Plagioclase is unzoned oligoclase, though in some cases a thin albite rim is observed. Muscovite occurs as: i) single small- to medium-grained flakes enclosed in feldspar; ii) coarse grained crystals associated to biotite, fibrolite, and opaques, iii) in intergrowth with biotite to form thin elongated, slightly oriented trails, marking the faint foliation. Mesosomes are medium-grained, well foliated rocks, consisting of quartz, plagioclase muscovite, , biotite, fibrolite \pm K-feldspar \pm garnet. Fibrolite, muscovite and biotite are associated, to form strongly oriented, thick levels. Muscovite also occurs as unoriented crystals, showing quartz exsolutions and thin rims. A few mm-thick melanosome is usually present at the boundary between the leucosomes and mesosomes. Leucosomes are characterized by: SiO₂: 75.4-77.9; Al₂O₃: 13.2-14.5; Fe₂O₃tot: 0.3-0.5; MgO: 0.1-0.2; CaO: 2.7- 3.7; Na₂O: 3.9-4.6; K₂O: 0.4-0.6 wt.%. An interesting feature is the relative high calcium content already described in other sedimentary-derived migmatite from Sardinia (Cruciani et al., 2008). In the normative Ab-An-Or diagram (Barker, 1979) the leucosomes plot at the boundary between trondhjemite/tonalite fields. All leucosomes are corundum normative and peraluminous. Mesosomes show a lower content of silica and higher content of iron, magnesium and potash. Major elements ranges are: SiO₂: 69.9-70.2; Al₂O₃: 12.8-13.3; Fe₂O₃tot: 5.4-5.6; MgO: 2.1-2.3; CaO: 2.0-2.1; Na₂O: 2.4-2.5; K₂O: 2.2-2.4 wt%. Chondrite-normalized REE pattern, shows that all leucosomes are characterized by a positive Eu anomaly and a significant enrichment in LREE. Mesosomes pattern shows a marked negative Eu anomaly, an enrichment in LREE and a depletion in HREE. Total REE content is higher in mesosomes (132-156 ppm) than in leucosomes (51-58 ppm). Trondhjemite/tonalite composition with high CaO, Na₂O and low K₂O of the leucosomes will be discussed in relation to their significance and origin.

References:

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