



Magmatic garnet in the Shir-Kuh granitoidic batholith, SW Yazd, Central Iran

M. Sheibi (1), D Esmaily (1), and A Nedelec (2)

(1) Department of Geology, College of Science, University of Tehran, Iran (sheibi58@yahoo.com), (2) UMR 5563, LMTG-OMP, Université Paul-Sabatier, 14 Avenue Edouard Belin, 31400 Toulouse, France

The peraluminous, calc-alkaline, S-type granitoid of Shir-Kuh batholith in Central Iran is intrusive into Lower Jurassic sandstones and shales. It consists of three main facies: a granodioritic facies ($\text{SiO}_2 = 63 - 64\text{wt. } \%$) to the north, a monzogranitic facies ($\text{SiO}_2 = 66 - 70 \text{ wt}\%$) which is widespread throughout the area and a leucogranitic facies ($\text{SiO}_2 = 74 - 76\text{wt}\%$) along the north-western margin of the batholith.

One garnet housed in the monzogranitic facies was chosen for compositional mapping and zoning profile. Almandine and spessartite together compose at least 80.6% of the total molecular composition. Pyrope is the next most abundant constituent; andradite and grossular very rare or absent uvarovite, together make up the remainder. The spessartine component is enriched in grain rim. A spessartine component between 5.4 to 5.8% is representative of the large unzoned homogenous central area, whereas the marginal rims typically have 7-11% (average = 7.6%). Thus, the profiles exhibited relatively Mn-poor central zones and relatively Mn-rich marginal rims zones, constituting a “spessartine inverse bell-shaped profile” Which is similar to those in other peraluminous plutons and, in particular, to the magmatic garnets reported by du Bray (1988).

The HREE pattern from selected samples of monzogranites also indicates that garnet was absent from the source rock during the generation of the primary magma and remarkably, it crystallized throughout the differentiation sequence of the Shir-Kuh granite.

The chemical compositions of the garnet and whole rock geochemistry indicate that it could have formed by direct nucleation and subsequent crystallization from the peraluminous magma in equilibrium with solid phases such as biotite.