

## **Corundum-leucosome-bearing aluminous gneiss from Ayyarmalai, Southern Granulite Terrain, India: a textbook example of vapour-phase-absent muscovite melting in silica-undersaturated pelitic rocks**

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The Palghat-Cauvery high-pressure granulite belt (PCSZ) marks an important Neoproterozoic crustal suture which separates Archaean cratonic blocks (north) from Palaeo- to Neoproterozoic granulite terrains (south) in southern India. Assemblages and reaction textures of Mg-Al granulites indicate the supracrustal rocks experienced extreme metamorphic conditions. Published *P-T* estimates and inferred *P-T* paths are, however, equivocal: [1] 950-1000 °C, ~15 kbar, steep anticlockwise *P-T* loop; [2] ~900 °C, 10-12 kbar, clockwise *P-T* loop.

In this contribution we describe a corundumleuco-some-bearing biotite-plagioclase paragneiss from a newly discovered locality near Ayyarmalai in the eastern extension of the PCSZ, which provides a superb example of muscovite melting in silica-deficient aluminous rocks. The migmatitic structure is defined by closely spaced centimetre-decimetre scale leucosomes that host large euhedral corundum crystals. Mesosome domains show a well recrystallized weakly foliated fabric made up of plagioclase (An<sub>21</sub>Ab<sub>77</sub>Or<sub>2</sub>) and biotite (4.9 wt% TiO<sub>2</sub>, X<sub>Mg</sub> = 0.51-0.47). The contacts with the leucosomes are sharp, and no melanosome selvages are developed. The corundum crystals are located in the centre of the leucosomes, in a matrix of coarse-grained perthitic alkali feldspar (integr. comp.: An<sub>2</sub>Ab<sub>35</sub>Or<sub>63</sub>), minor relict biotite (4.25.1 wt% TiO<sub>2</sub>, X<sub>Mg</sub> = 0.48-0.46) and plagioclase (An<sub>21</sub>Ab<sub>78</sub>Or<sub>1</sub>). Accessory apatite and zircon occur in both mesosome and leucosome, while opaque phases are absent. The mineralogical, textural and chemical characteristics of the migmatite indicate leucosome formation through vapour phase-absent muscovite melting, focussed around the sites of nucleation and growth of peritectic corundum. The contrasting chemistry of leucosome and mesosome domains points to significant bi-directional element transfer. The *P-T* pseudosection for the paragneiss suggests onset and completion of muscovite-melting along a steep narrow reaction band which extends from c. 6 kbar/700 °C to c. 12 kbar/800 °C. As biotite remained stable and was not involved in melting reactions, peak-temperatures of metamorphism did not exceed ~900 °C, consistent with the results of feldspar thermometry. When combined with the *P-T* data for garnetiferous basic granulite in the area, these *P-T* constraints are consistent with a clockwise *P-T* evolution of supra-crustal granulites in the eastern PCSZ that did not exceed 900°C and 10-12 kbar.

### References

- [1] Kelsey, D E, Clark, C, Hand, M, Collins, A S (2006) *EPSL* 249: 529-534.
- [2] Santosh M, Sajeew K (2006) *Lithos* 92: 447-464.

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