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Figure DR1

Microstructural evidence of primary trapping of melt inclusions in andalusite (And), with reference to genetic criteria outlined by Roedder, 1984. A) Silicate melt inclusion trapped in a resorbed andalusite grain. The large inclusion size relative to that of the host, and its isolated occurrence point toward a primary trapping during andalusite growth, which predated andalusite resorption and replacement by oriented sillimanite (Sil). Width of view = 0.8 mm. B) Tubular-shaped melt inclusions in andalusite. The long dimension of the inclusions is perpendicular to the crystallographic *c* axis (arrow) of the andalusite host. The parallel arrangement and occurrence as a small group in a otherwise inclusion-free crystal suggest a primary trapping of the melt inclusions (see Roedder, 1984, Fig. 2-13b). Graphite solid inclusions (G) enclosed in the andalusite host are also visible. Width of view = 0.4 mm. C) Isolated, tubular melt inclusions in andalusite (arrows). The presence of the hercynite solid inclusion (h) in the centre probably interfered during the growth of andalusite host, causing the primary trapping of the adjacent melt inclusion (see Roedder, 1984, Fig. 2-1f, 2-12b, and p. 15). Width of view = 0.8 mm.

References

Roedder, E., 1984, Fluid inclusions: M.S.A. Reviews in Mineralogy, v. 12, 644pp.

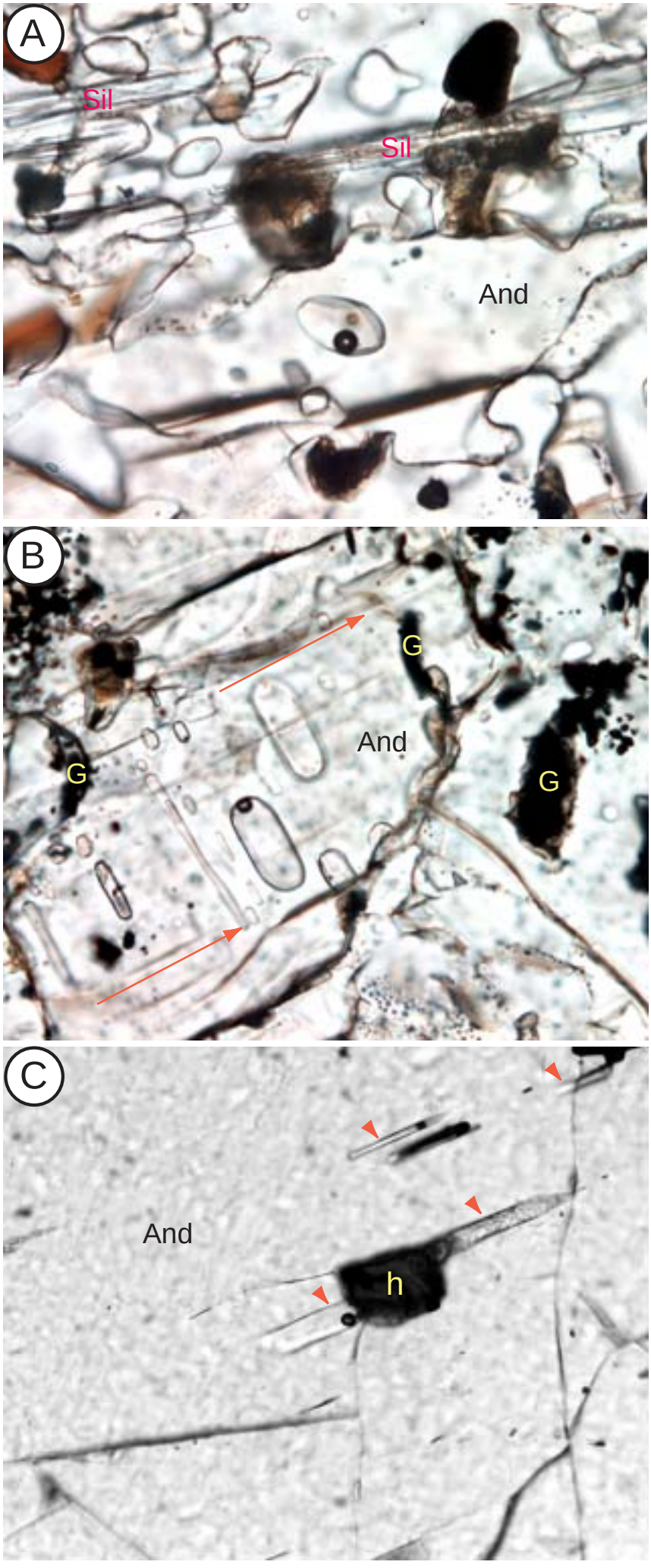
Appendix DR1 - Analytical Methods

EMP analyses were performed with a CAMECA SX50 at the Centro de Instrumentación Científica, University of Granada. To minimize the time-dependent loss of Na and K during analysis, and the consequent apparent increase of the nonmobile elements (especially Al and Si), analytical conditions were set following Morgan and London (1996). We used a 20 kV, 2 nA, 5 μm beam with Na, K, and Al measured first. Counting times were 30 s for all elements except Cl (20 s). The use of a 5 μm beam diameter, compared to the recommended value of 20 μm, was obliged by the small size of the majority of the melt inclusions. Trace element analyses were performed by LA-ICP-MS at the Research School of Earth Sciences (ANU, Canberra) by using a pulsed 193 nm ArF Excimer laser, with 100 mJ energy at a repetition rate of 5 Hz, coupled to an Agilent 7500 quadrupole ICP-MS. The spot size was 19 μm

(142 μm in andalusite), and the drilling through the melt inclusion was monitored by time-resolved analysis. A NIST-612 glass was used as standard. Ca values obtained from EMP were used as the internal standard. As the host andalusite is Ca and trace element free, possible small host contamination did not affect the (Ca/trace element) ratio and hence the determined trace element concentration of the melts. Owing to the small size of the inclusions, estimated errors are ~10%–20%.

References

Morgan, G.B., VI, and London, D., 1996, Optimizing the electron microprobe analysis of hydrous alkali aluminosilicate glasses: American Mineralogist, v. 81, p. 1176–1185.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