Appendix C. Supplementary data

Here we take Grt-7 as an example for calculation the volume proportions of inclusion-zoned garnet using a spherical model (Fig.S1). The average radius of garnet core is 0.32mm, core and mantle (0.73 mm), rim (0.73-1.0 mm), and the accumulated volume are 0.14 mm^3 and 1.63 mm^3 for the core, core and mantle of Grt-7, respectively. A total volume of Grt-7 is qualitatively estimated at 2.0 mm^3. Therefore, the individual part or accumulated volume proportions of the garnet can be extracted as listed in table S1. Supposed the total mode of garnet is 20 mol.% in sample MJG5, the mode of accumulated and individual part of garnet can be calculated as table S1. Finally, the estimated accumulated volume proportions are 7, 81.5 and 100 vol.%, corresponding to accumulated modes proportions of 1.4, 16.3 and 20 mol.% for the core, core and mantle, and entire garnet. Combined with the mineral assemblages developed within the inclusion-zoned garnet, the garnet core, core and mantle, and entire garnet are corresponding to the pre-peak, peak and post peak stages. Accordingly, *P-T* evolution of the investigated samples can be constrained.

In our sample, the modal proportions of garnet during prograde, peak and retrograde are estimated at ~1-2, ~14-18 and ~0-2 mol.%, respectively. Finally, a *P-T* path of the Sample MJG5 is reconstructed as Fig.7b. This is also consistent with the composition (X_{Grs}) evolution of garnet. More detailed information is given in the text.

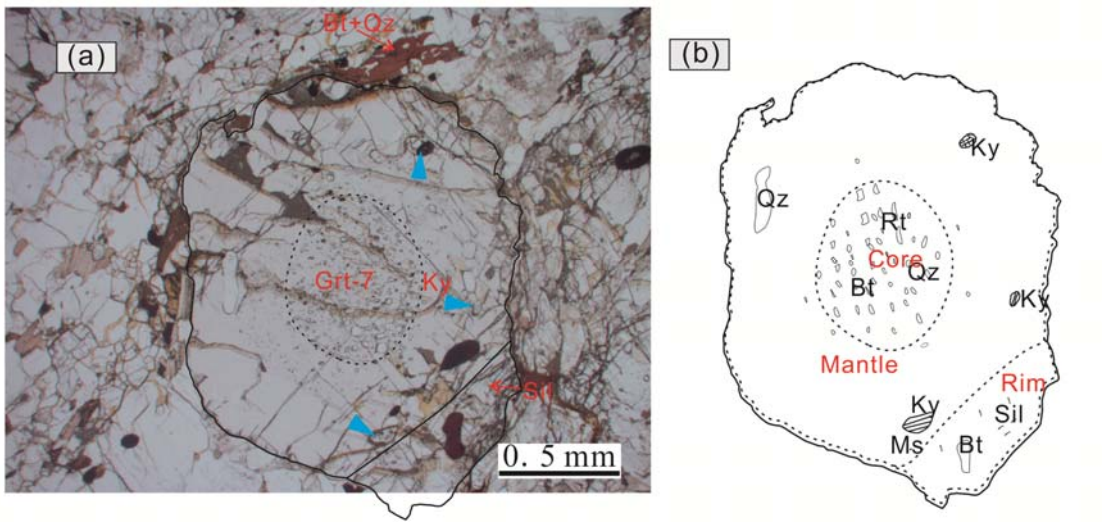

Fig.S1. Inclusions patterns of zoned Grt-7, (a) the same as Fig.3i, (b) sketch of zoned garnet, with crowded quartz in the core, rare inclusions in the mantle, kyanite±muscovite (high SiO_2) in the in outer manthe, and sillimanite in the rim.

Table S1. The mode, volume proportions of inclusions-zoned Grt-7.

Grt-7	inclusions	Accumulated radius (mm)	Accumulated Volume ($(4/3*\pi*r^3)$)	Accumulated Vol. %	Individual Vol.%	Accumulated mol. %	Individual mol.%
core	Qz, Ms, Bt, Rt	~0.32	0.14	7	7	1.4	1.4
Mantle	Qz, Ky, Spl, Bt, Rt	~0.73	1.63	81.5	74.5	16.3	14.9
rim	Sil, Bt, Qz	~0.73-1.0	2	100	18.5	20	3.7