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Remelting of nanogranites in peritectic garnet from granulites of Jubrique, Betic Cordillera, Southern Spain

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Peritectic minerals in migmatites can trap droplets of melt that form via incongruent melting reactions during crustal anatexis [1]. In most cases, these melts crystallize and form nanogranites upon slow cooling of the anatectic terrane [2]. To obtain information on the primary compositions of crustal melts, including volatile concentrations in melt and information on fluid regimes, nanogranites must be remelted and rehomogenized before analysis [3].

A new occurrence of nanogranites was recently reported in granulitic gneisses at the bottom of the prograde metamorphic sequence of Jubrique, located on top of the Ronda peridotite slab (Betic Cordillera, S Spain) [4]. These nanogranites are trapped in garnet porphyroblasts. They show partially irregular to well facetted negative crystal shapes, and have variable size from $\sim$5-10 μm to several tens of μm or even $\sim$200 μm in diameter. They appear at the core and rim of large Grt crystals, and are composed of rare glass, daughter Qz, Pl, Kfs, Bt and Ms, and solid inclusions of Ky and less frequently Gr, Hc, Rt, Ilm, Zrn and Mnz. Ky was the main solid phase that favored the trapping of melt inclusions (MI) by poisoning crystal surfaces during Grt growth. The presence of Ky+Rt within MI, and their occurrence in the high-P cores of Grt, suggest that partial melting in the gneisses initiated at relatively high P conditions, and that most Grt in these rocks crystallized in the presence of melt.

To recover the major and trace element composition of the primary melt during anatexis, we performed remelting experiments on chips of MI-bearing Grt separated from a sample of gneiss at Jubrique, using a piston cylinder apparatus. Experiments were run at 800, 825 and 850˚C, 15 Kbar and dry conditions (i.e. no added H_2O) for 24 hrs. Preliminary results of the first experiment at 850º show that nanogranites have been successfully remelted; they all contain glass regardless of their textural position, i.e. at the core and rim of large Grt or in small single Grt. Glass is leucogranitic (SiO_2 $\approx$65wt%; FeO+MgO$\approx$2 wt%), potassic (K#$\approx$12), high in ASI (close to peraluminous) and hydrous (H2O, estimated by deficiency from 100% in the EMP analysis, $\approx$11wt.%.). The degree of remelting, however, varies among inclusion regardless of the textural position; some inclusions only show glass whilst others have, in addition, residual Als$\pm$Qz$\pm$Sp$\pm$Bt$\pm$Gr plus new St, which overgrows on Ky. The presence of St, decrepitation cracks, Grt reaction rims and irregular boundaries in some inclusions suggest interaction between melt and Grt and/or overheating during the experiment.

[1] Cesare et al. (2011) J. Virt. Expl., **40**, paper 2. [2] Cesare et al. (2009) Geology, **37**, 627-630. [3] Bartoli et al. (2013) Geology, **41**, 115-118. [4] Barich et al. (2013) GSA Abstracts with Programs.