Neocrystallization of zircon during ultramylonitization: Cases from the Sveconorwegian and Mozambique Belts

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Syn-ultramylonitization crystallization of zircon can be demonstrated in the amphibolite-facies strike-slip Macaloge Shear Zone, Mozambique belt, NE Mozambique, while it can not be shown in the extensional Nisser Shear Zone, Sveconorwegian belt, S Norway. The Macaloge Shear Zone is a prominent late- to post-Pan-African left-lateral, NE-trending shear array, 20 km wide and 150 km long, visible from airborne geophysic maps, in the Unango Complex. A sample of granitic microlayered ultramylonite, with microscopic evidence for left lateral sense of shear, is characterized by feldspar porphyroclasts in a granulated quartz-muscovite-biotite-ilmenite-bearing matrix (10-100 μm). Feldspar and quartz microtextures suggest deformation between 450 and 600 °C. BSE, CL, EBSD and SIMS data were collected in zircon and surrounding minerals in thin section and epoxy mount. Pristine oscillatory-zoned magmatic zircon porphyroclasts have an age of 1047 ± 6 Ma ($0.15 < Th/U < 0.7$), in accordance with regional geochronology. Zircon porphyroclasts are characterized by widespread brittle fractures, low angle crystallographic boundaries and evidence for partial re-crystallization corresponding to a progressive change to patchy zoning. Elongate aggregates of angular to rounded zircon fragments derived from crushing of a single porphyroclast are observed. Xenotime and thorite microcrystals are observed within these aggregates and inside fractures in zircon porphyroclasts. Small (<100 μm), oblate and rounded, Th-poor (Th<18 ppm) and U-rich ($100 < U < 560$ ppm) zircon crystals, showing patchy to concentric zoning, yield concordant and well clustered U–Pb data. These crystals are interpreted as grown during deformation, around a zircon seed, in co-precipitation with thorite and xenotime. Their age of 445 ± 4 Ma (n=11) record the timing of ultramylonitization.

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