TRANSMISSION ELECTRON MICROSCOPIC STUDY OF QUARTZ RODS WITH INTERGROWN AMPHIBOLE WITHIN OMPHACITE IN ECLOGITES FROM THE SULU ULTRAHIGH-PRESSURE METAMORPHIC TERRANE, EASTERN CHINA

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Oriented quartz rods in clinopyroxene have been observed in eclogites and garnet clinopyroxenites from several ultrahigh-pressure (UHP) metamorphic terranes. They are often interpreted as an exsolution phase from supersilicic clinopyroxene, which is stable at UHP, and are therefore used as an indicator of UHP metamorphism (LIOU, 1998; TSAI & LIOU, 2000). However, PAGE et al. (2004) argued that the presence of quartz precipitates in clinopyroxene does not necessarily indicate UHP metamorphism. In this study, we used conventional petrographic tools and transmission electron microscopy to study quartz precipitates in omphacite from six eclogite samples collected near Donghai in the Sulu UHP metamorphic terrane, eastern China. The constituent minerals of the eclogite are garnet + omphacite + amphibole + rutile ± zoisite ± quartz ± phengite ± kyanite ± apatite ± talc. Few palisade quartz, presumably after coesite, occurs as inclusions in omphacite and garnet. The oriented quartz rods in omphacite host are generally ~1 μm wide and 10 - 50 μm long. They are intergrown with bluish-green calcic amphibole. It appears that thicker rods of quartz are accompanied with larger grains of amphibole. Both quartz and amphibole precipitates have a preferred orientation with host omphacite: $(010)_{Omp}$ // $(010)_{Qtz}$ and $[001]_{Omp}$ // $[001]_{Qtz}$, and $(010)_{Omp}$ // $(010)_{Amp}$ and $[001]_{Omp}$ // $[001]_{Amp}$. On the basis of their microtextures and mineral association, we propose a two-stage growth mechanism for the quartz and amphibole precipitates in omphacite: (1) very fine quartz rods exsolved from a supersilicic clinopyroxene during decompression, creating grain boundaries between quartz rods and host, (2) growth of amphibole and quartz along the grain boundaries with fluid participation and at the expense of omphacite during retrograde metamorphism.

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