

Identification of high- to ultrahigh-temperature granulite facies metamorphism of the Gurye-Hadong area in the Yeongnam Massif, South Korea

MIN SU KANG, PH, D STUDENT AND BYUNG CHOON LEE

Chonnam National University

The Yeongnam Massif, one of the Paleoproterozoic tectonic provinces of the Korean Peninsula, experienced high-temperature metamorphism reaching granulite facies conditions during the Paleoproterozoic (ca. 1870-1854 Ma). Recently, the ultrahigh-temperature metamorphism has also been recognized in the garnet-orthopyroxene granulite xenoliths in the Sancheong anorthosite, southern part of the Yeongnam Massif. In previous study, it was suggested that this ultrahigh-temperature metamorphism might be occurred in regional scale under the extensional tectonic setting. However, until now, the ultrahigh-temperature metamorphism does not recognize in other part of the Yeongnam Massif. Therefore, it is unclear whether the ultrahigh-temperature metamorphism prevailed in the Yeongnam Massif. In this context, we conducted a detailed study of metamorphic rocks distributed in the Gurye-Hadong area, located in the central-western part of the Yeongnam Massif.

The main rock types in the study areas are meta-granitoids and granitic gneiss with minor amphibolite. The meta-granitoids mainly show blastoporphyratic texture and the feldspar phenocrysts reach the size up to 8 cm. This granitoid is composed of the garnet+biotite+plagioclase+K-feldspar+ilmenite+quartz, and Fe-spinel (hercynite) is observed in the garnet core. Meanwhile, the granitic gneiss shows light color and has leucosome and melanosome indicating the occurrence of the partial melting. The granitic gneiss is composed of garnet+biotite+plagioclase+K-feldspar+ilmenite+sillimanite+Fe-spinel (hercynite)+quartz. Fe-spinel(hercynite) is observed in meta-granitoids and granitic gneiss indicating that both of rocks might be underwent high- to ultrahigh-temperature metamorphism. SHRIMP U-Pb analyses of zircon from meta-granitoids yields a crystallization and metamorphic age of 1875.0 ± 6.2 Ma and 1869.6 ± 4.0 Ma, respectively. The zircon core from granitic gneiss yields a maximum depositional age of 1912 ± 6.0 Ma and zircon rim yields metamorphic ages of 1871.1 ± 4.7 Ma. Phase equilibria modeling reveals peak metamorphic conditions of 917-927 °C/10.4-10.7 kbar for meta-granitoids and 882-888 °C/9.8-10.3 kbar for granitic gneiss. These data suggest that the Yeongnam Massif possibly underwent regional high- to ultrahigh-temperature metamorphism at ca. 1871.1-1869.6 Ma. Considering the previous study, this high- to ultrahigh-temperature metamorphism might be occurred in extensional tectonic regimes such as slab breakoff or slab roll-back.