Japan Geoscience Union Meeting 2010
(May 23-28 2010 at Makuhari, Chiba, Japan)

SMP055-02 Room:ファンクションルームB Time: May 23 14:00-14:15

Zircon U-Pb ages, trace element and Hf isotope compositions of migmatites from the Higo metamorphic terrane, Japan

Kenshi Maki[1*], Tzen-Fu Yui[1], Mayuko Fukuyama[1], Kuo-Lung Wang[1], Uwe Martens[2], Marty Grove[2], J. G. Liou[2]

[1]IES, Academia Sinica, [2]Stanford University

The migmatites of the Higo low-P /high-T (andalusite-sillimanite type) metamorphic terrane, central Kyushu, Japan are pervasively distributed in the upper amphibolite to granulite facies zones and are divided into two broad types, metatexite and diatexite. In the highest grade zone, nebulitic migmatites (diatexite) occur as a 3 m-thick layer and is sandwiched between 2 m-thick layers of storomatic migmatites (metatexite) within pelitic gneisses. Both types of migmatites are parallel to the foliation of the gneisses. The migmatites and pelitic gneisses have the same mineral assemblage of biotite + garnet + plagioclase + K-feldspar + quartz + zircon + ilmenite + rutile + pyrite. Parageneses and compositions of minerals yield P-T conditions of migmatization and granulite-facies metamorphism at 12 kbar and 800 ℃.
To constrain the age of metamorphism and give more information of the migmatization, zircons of the migmatites and pelitic gneisses were analyzed for trace elements and SHRIMP U-Pb ages and LA-MC-ICPMS Hf isotope compositions. Zircons from nebulitic migmatites occur as euhedral and elongate crystals without core and rim structure, and show oscillatory zoning. On the other hand, zircons from pelitic gneisses and stromatic migmatites are euhedral, and comprise an inherited core surrounded by a thin overgrowth. The overgrowth zircon of the stromatic migmatite yields an U-Pb SHRIMP age of 116 $\pm$1.6 Ma, which is older than the U-Pb age of 110 $\pm$0.6 Ma of the zircon from the nebulitic migmatite. The overgrowth zircon has also lower Th/U ratio than the nebulitic migmatite zircon. The nebulitic migmatite zircon shows HREE depletion, which is different from the steep heavy-enriched REE pattern of the overgrowth zircon of the stromatic migmatite and pelitic gneiss although the nebulitic migmatite zircon is similar to the overgrowth zircon in terms of high Y content, positive Ce anomaly and negative Eu anomaly. $^{176}Hf/^{177}Hf$ values of the inherited and overgrowth zircons are indistinguishable, but different from the values of the nebulitic migmatite zircon. Based on the U-Pb ages, trace elements and Hf isotope characteristics, we conclude that the overgrowth zircons of the stromatic migmatite formed in a closed-system at the onset of in situ partial melting, and the zircons of the nebulitic migmatite crystallized from the externally derived melt, and the crystallization was associated with concurrent formation of garnet in the nebulitic migmatite.

Keywords: Migmatite, Zircon, U-Pb SHRIMP age, Trace elements, LA-MC-ICPMS Hf isotope analysis, Higo metamorphic terrane