

Geochemistry for the Serpentinites of the Igneous and Metamorphic Origins

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I. Introduction

Several masses of the alpine type ultramafic rocks are found within the Precambrian Kyeonggi gneiss complex, western part of Chungnam province. They occur as discontinuous isolated lenticular bodies along the fault line(NNE direction), dominant tectonic directions of Kyeonggi gneiss complex. The ultramafic rocks occur as fault contacts with the adjacent Precambrian metamorphic and metasedimentary rocks. They are several ten to hundred meters in wide and several hundred meters to kilometers in length.

Recently, two types of the ultramafic masses are recognized within the Precambrian gneiss complex: igneous origin-like types (GIO) and metamorphic origin-like types (GMO). In this study, we provide petrography, mineralogical and geochemical characteristics for the two genetical different types of ultramafic masses.

2.Methods

Samples of the ultramafic rocks were collected from several ultramafic localities, western parts of the Chungnam provinces. Selected fresh samples are analysed to determine major and trace elements with ICP and ICP/MS and representative mafic minerals are also determined with an energy dispersive spectrometer (EDS).

3.Results

Two types of the ultramafic masses are distinctive in the respects of petrography and geochemical and mineralogical compositions.

Under the microscope, the igneous origin-like types(GIO) show relatively equigranular mosaic texture with submylonitic textures while the metamorphic origin-like types(GMO) show porphyroclastic and recrystallization textures with protogranular textures. The GIO contain low fosterite olivine($FO_{79.5-84.5}$), magnesian orthopyroxene ($En_{81.0-83.0}$), and high magnesian clinopyroxene(Mg , 88.0-92.5) while the GMO have high fosterite olivine ($FO_{88.5-92.5}$) and magnesian orthopyroxene ($En_{88.0-93.0}$).

In the major element contents, the GIO show high Al_2O_3 (2.9-5.81 wt %), MnO (0.16-0.19 wt %), TiO_2 (0.094-0.314 wt %) contents, and magnesium ratios (= molecular $100 * Mg / ((Mg + Fe(t)))$, 81.9-84.5) and CaO/MgO ratios(0.057-0.145), which are compared with the GMO, showing 1.12-3.32, 0.068-0.12, 0.007-0.12, 89.8-92.7 and 0.009-0.06

respectively. The GIO show slightly higher CaO, Na₂O, K₂O and P₂O₅ contents than the GMO.

In the incompatible element contents, HFS(e.g., Rb, Ba, Sr) are variable in the GMO and in the GIO(42-97 ppm), Sr contents, are high relative to the GMO(2-2.9 ppm). In the LFS(e.g., Th, Nb, Zr, Hf) contents, the GMO show slightly variable and the GIO are slightly high relative to the GMO.

In the REE contents, the GIO are high in the most of elements relative to the GMO except the HREE(e.g., Yb, Lu), and large different contents are shown in the LREE. In the La_N/Yb_N ratios, the GIO range from 4.75 to 7.95, but, ranging from 0.72 to 7.5 in the GMO. In the transitional element, the GIO and GMO, both, show high Cr(>1010 ppm) and Ni(>293 ppm) contents, but distinctive differences do not shown between two varieties.

Key Word: ultramafic mass, igneous origin-like types(GIO) and metamorphic origin -like types(GMO)

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