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Mineral Chemical Characteristics of Gabbro-diorite for Shulouqiu Uranium Deposit in Northern Guangdong, China: Constraint on the Magmatic Source

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1 Introduction

The uranium deposits related with Indosinian and Yanshanian granite have provided the abundant resource of uranium during the past several decades in China. The deposits are mainly distributing in the Guidong granite body and Zhuguang granite body, Northern Guangdong province, China, including the Xiazhuang, Changjiang and Lujian uranium ore field. Uranium ore is being hosted by the silicified crushed zone in the granite body or Precambrian slate near the granite body. Previous scientific studies revealed that the uranium mineralized genesis is related with the mantle degasification and lithosphere extension of South China during the Late Mesozoic (Hu et al., 2008).

Shulouqiu uranium deposit(SLQ deposit), a large scale deposit in Changjiang uranium ore field, located at the southern part of Zhuguang body which were emplaced in the Early Indosinian and Early Yanshanian. This deposit is restricted by the NE-striking regional fracture and its ore is hosted in the NS-striking secondary fracture accompanying with strong silicification, hematitization, sericitization, chloritization, albitization and kaolinization. The gabbro-diorite and its fertile uranium mineralization have been firstly explored by the drill hole during the past several years. The mineralized characteristic is the same as the intersection type uranium mineralization in Xiazhuang uranium ore field. However, the genesis of gabbro-diorite was still poor understood, impeding to acquaint this mineralize type in Changjiang uranium ore field. In this paper, we provide the chemical characteristic of the rhythm band plagioclase and biotite to restrict the genesis of gabbro-diorite in SLQ uranium deposit.

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2 Sample and analysis

Gabbro-diorite was collected from the ZK26-1 drilling core of No.26 exploration section in SLQ deposit. The gabbro-diorites are dark green in color and fine grained with a gabbro texture. Gabbro-diorite consists of plagioclase (~35 vol.%), diopside (~25 vol.%), potash feldspar (~20 vol.%), biotite (~10 vol.%), quartz (~5 vol.%) and hornblende(~5 vol.%), as well as minor amount of magnetite, pyrite, zircon and apatite. Diopside and biotite occasionally altered to epidote, chlorite, and plagioclase altered to sericite. The pollutional phenocryst of quartz and feldspar from granite were easily observed in the hand specimen and thin section. The plagioclase with the rhythm band can be easily distinguished in the orthogonal polarization photo under an optical microscope. The interference color is bright white in the core, and is gray in the mantle of plagioclase. However, the interference color is white in the margin.

The sample (CJ1603) has been used for mineral chemical analysis by electron probe analysis (JEOL-JXA8100, manufactured in Japan) at the key lab of nuclear resource and environment, East China University of Technology (ECUT).

3 Results

A typical rhythm band plagioclase was selected to analyse the content of major element from core to margin. The An, Ab and Or end member contents are calculated on the basic of major element of plagioclase. The contents of CaO, Al_2O_3 and An become lower from the core to the margin of plagioclase (Fig.1a and Fig.1b). On the contrary, the contents of SiO_2, Na_2O and K_2O gradually become higher (Fig.1a and Fig.1b). The An value is 70.11 at the core of plagioclase and indicate that the core end member

belongs to the bytownite, suggesting the magma chamber was consisted with basic magma at the early stage. The mantle and margin end member is labradorite and andesine, respectively, indicating the property of magma have evolved to neutral part at the crystallographic late stage of plagioclase. Moreover, the core and margin proportion is much narrower than the mantle.

The major elements from core to margin of biotite also expressed a regular variation. The content of FeO^t becomes higher, but the content of MgO and $Mg^{\#}$ appear lower from the core to margin of biotite. The $Mg^{\#}$ value of the core is 72.49, plotting in the $Mg^{\#}$ range of the primitive magma (68-75), suggested that the character of initial magma was of basic nature in the magma source. However, it has evolved to neutral magma later, considering the $Mg^{\#}$ value is down to 66.14 at the margin of biotite. And the Al_2O_3 and TiO_2 contents plot in a relatively uniform range (14.04-14.24 wt.% and 3.27-5.15 wt.%, respectively).

4 Discussion and conclusion

The core component of plagioclase and biotite indicated that the magma was of basic composition at the early crystallographic stage of plagioclase and biotite in the magma reservoir. Whereas, the saltation the composition from core to mantle or margin of plagioclase and biotite in gabbro-diorite suggested that the magma of early stage tempestuously evolved from basic magma to neutral magma at the course of crystallization of plagioclase and biotite.

The major elements of biotite can effectively distinguish the source of the host rock. The cores of biotite have higher MgO content and completely plot in the mantle source (Fig.1c). However, the mantles have lower content of MgO and completely plot in the intersection of mantle source and crust-mantle source. And the margins of the biotite absolutely plot in the crust-mantle source. This variation of magma source indicated that the crustal component has probably taken part in the magma chamber.

The constitutionally transform of magma nature has been perfectly recorded by the compositional variation from core to margin of plagioclase and biotite in gabbro-diorite. The initial magma regards as basic magma in the source. Crustal material dropped into the magma source when the basic magma emplaced through the channel in the asthenosphere. Hence, the nature of the magma transform to neutral magma. The gabbro-diorite is formed in the process of crust mantle intersection which has been perfectly recorded by the crystallization of plagioclase and biotite.

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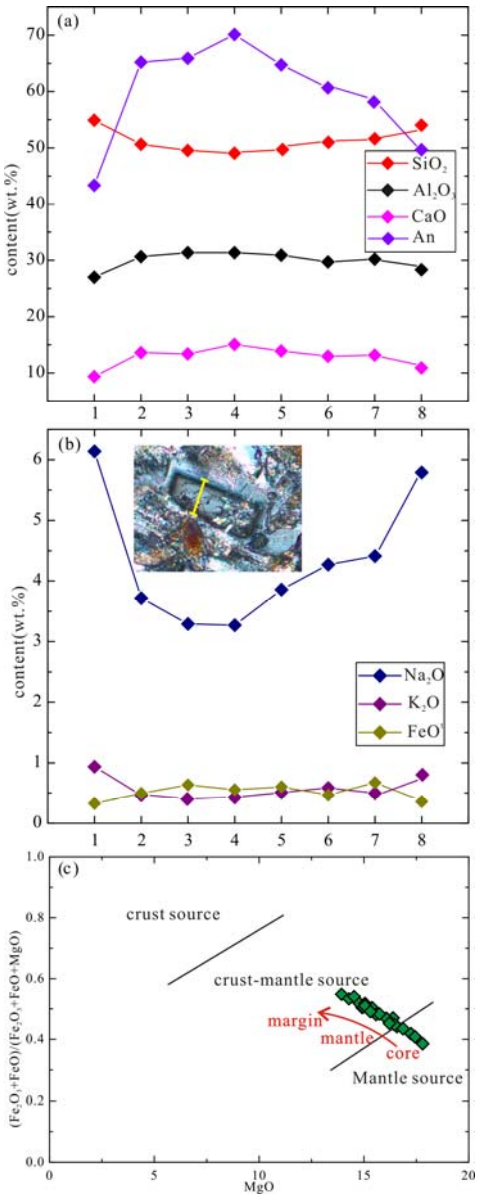


Fig. 1 Variation of major element in band plagioclase (a,b) and MgO-(Fe_2O_3+FeO)/ (Fe_2O_3+FeO+ MgO) diagram of biotite in gabbro-diorite(c)

References

Hu Ruizhong, Bi Xianwu, Zhou Meifu, Peng Jiantang, Su Wenchao, Zhao Junhong, 2008. Uranium Metallogenesis in South China and Its Relationship to Crustal Extension during the Cretaceous to Tertiary. *Economic Geology*.103 (3): 583-598