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Micro Characteristics of Chert in Volcanic rocks of Xiong'er Group in the Southern Part of the North China Craton

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Xiong'er group, developed in Xiong'er valley of southern North China Craton, has absorbed widely academic attentions recent years. In this contribution, the cherts occurred in Majiahe volcanic rocks on the top of Xiong'er group were examined by XRD, RAMAN and EPMA analysis in order not only to deepen the understanding of chert mineral evolutions, but also create relationship between the macros and microscopic features of chert.

1 Sample Location and Description

The examined area is located in Fudian town of Ruyang county, Henan Province, China, which is sandwitched in basaltic andesite and andesitic lavas on the top of Xiong'er Group(Fig .1). The cherts show red, green, yellow-green and purple colors, trend in the direction of 310°, with a thickness ranging from several cm to 1 m. Chert is mostly composed of authigenic quartz much smaller than 0.01mm, and develop scryptocrystalline-amorphous and close-packed structures, consistent with quick crystallization and hydrothermal sedimentation characteristics.

2 Results and Discussions

The analysis were carried out in the Key Laboratory of Guangdong Geological Processes and Mineral Resources Exploration.

2.1 XRD analysis

XRD analysis showed that chert minerals are mainly composed of α-quartz and chlorite. α-quartz can be divided into two categories based on the lattice parameter: one kind is Pdf 75-0443 (unit cell parameters a = b = 4.913Å, c = 5.405Å, Z = 3), another is Pdf 01-0649, with cell parameters a = b = 4.903Å, c = 5.393Å, Z = 3. The chlorite within the cherts may either be directly derived from the original deposition, or from metamorphism of other silicate minerals.

2.2 RAMAN analysis

Quartz are mainly located on both sides of the veins (a→c and j→k), the representative peaks are 466 cm^{-1} and 612 cm^{-1} (Fig.2). Each Si atom in quartz is surrounded by four oxygen atoms, constituting [SiO_4] tetrahedral structures. Studies (Ke and Dong, 1998) show that 540~460 cm^{-1} are attributed to the symmetric stretching vibration of Si-O-Si bond, while the weaker peaks 800~600cm^{-1} correspond to the symmetrical Si-O-Si stretching vibration, indicating the impurities involved in the quartz.

2.3 Micro-component analysis

Under EPMA, the brightness of backscattered electron image show positively correlation with the proton numbers of elements in the substance. Namely, the lower the proton numbers in the elements of SiO_2 minerals, the darker and lower brightness of the backscattered electron image. The rhythm strip of quartz may indicate the original pulse deposition condition. The larger diameter SiO_2 quartz may reflect the lower precipitation rate and better crystallization. In addition, the sporadic, scattered distributed chlorite may come from chloritization of the primary sedimentary minerals.

3 Conclusions

(1) Quartz grains of different sizes are closely packed and distributed as rhythm, banded shape, exhibiting the periodic pulse features of hydrothermal activities.

Cherts consist dominantly of α-quartz. The parameters have two types: one is α-quartz, another is

short axis α-quartz, which are possible caused by the

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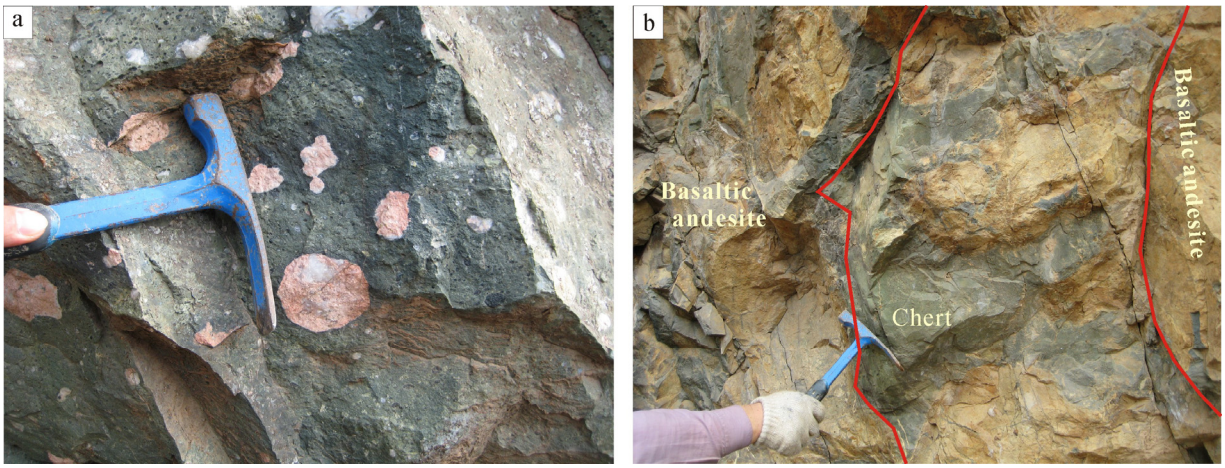

Fig. 1. Volcanic rocks (a) and the interbedded chert (b) of Xiong'er group.

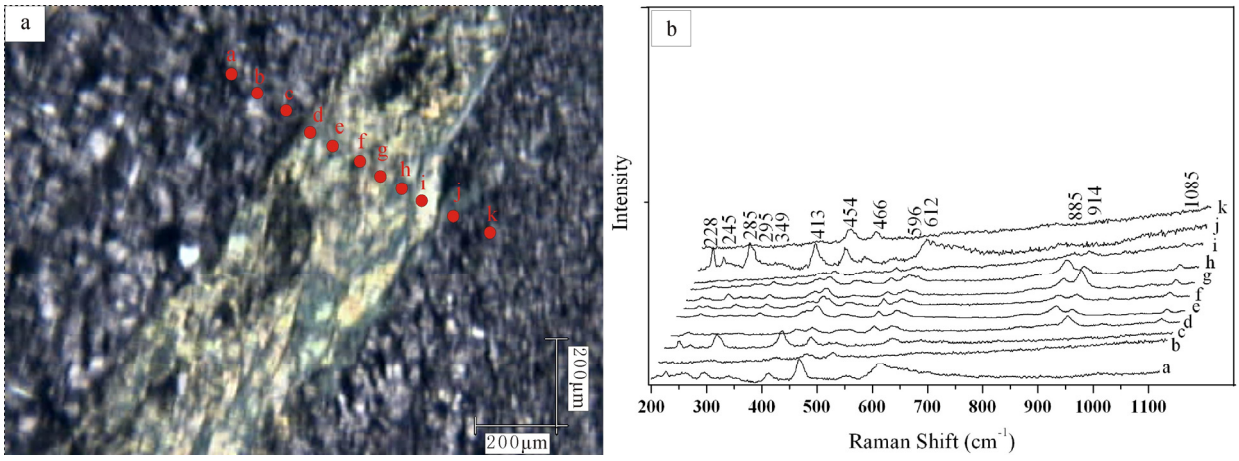

Fig. 2. Situ RAMAN analyses points (a) and results (b) of chert.

structural adjustment under temperature and pressure.

(3) Siliceous rocks contain small amounts of chlorite, calcium and iron silicate impurities, they were formed in different stages of chert evolution. Chlorite were sporadically disseminated and derived from the metamorphism of original clay minerals. Calcium and iron silicate minerals may come from the volcanic ashes during the chert precipitation.

(4) Carbonate hydrothermal precipitation within siliceous rocks are manifested by the carbonate veins intersected in the cherts, and fluid actions lead to the degree order increase of the quartz margins.

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