The textural and chemical properties of carbonate veins in Youngwol area, Korea

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Methods

Rock samples having carbonate veins were collected at 9 different locations close to thrust in Youngwol area, Korea. Thin sections of samples were examined under polarizing microscope. The chemical compositions and backscattered electron images of the samples were obtained with electron probe microanalyzer. Analyses of the major and trace element compositions of the veins and hosts in the rock samples were carried out using ICP-AES and ICP-MS. The oxygen/carbon isotopic compositions of the veins and hosts were also analyzed.

Results

The chemical analyses indicates that calcites and dolomites are dominant minerals both in the veins and hosts. The chemical compositions of veins are under the influence of the compositions of host rocks.

The concentrations of rare earth elements(REE) in veins are mostly higher than that in host rocks, and light REEs and Eu are relatively enriched in the veins. The oxygen and carbon isotopic compositions are variable but the $\delta^{18}O$ values of the carbonates in the veins are generally lower than those of host rocks. The $\delta^{13}C$ of carbonates in the veins have the similar values to those in the host rocks.

Conclusion

The chemical and isotopic compositions of the veins and hosts indicate that the vein forming materials were supplied from various sources, including immediately contacting hosts. The textures and mineralogical compositions indicate that the chemical and isotopic compositional characteristics may be modified by the later diagenesis, including dolomitization, after the vein formation.

Phase-shift interferometric study on feldspar dissolution rates under supercritical CO_2-water system

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On the assessment of the long-term stability of aquifer CO_2 storage, we should take into account several geochemical phenomena, especially feldspar dissolution in CO_2-dissolved water. In this study we tried to estimate the dissolution rates of these "insoluble" feldspar based on some useful surface observation techniques.

Experimental methods

A series of batch type dissolution experiments were performed at 80°C in deionized distilled water. The constant pressure of 10MPa was held for up to 4 weeks. We used natural cleaved anorthite and albite single crystals. Phase-shift interferometry was applied to the {001} cleavage for detection of the surface configuration changes on nanometer scale. To determine the dissolution rates from measurements of surface retreat, a part of the sample surface was covered with a gold thin film.

Results and discussion

Anorthite surface started to retreat within a day: so its dissolution rate was directly estimated from the height difference between the reference gold plane and the bare crystal surface. It was found that initially the dissolution rate was fast and then decreased to the final steady state, which was well consistent with some previous works.

On the other hand, any configuration changes were not observed on the albite surface even after 4 weeks. Then, we applied the alternative method such that the dissolution rate was estimated from the etch pit growth. In this method, we can obtain the dissolution rate efficiently by measuring only a slight increase in etch pit size and the slope of pit wall. Although there exist some data scattering, the phase-shift interferometry enabled us to detect slight increments of etch pit size (Fig.1). From these time-course changes in etch pit size (Fig.2), dissolution rate vertical to {001} face was determined.

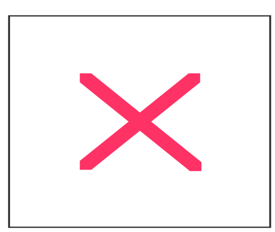

Fig.1 Albite etch pits.

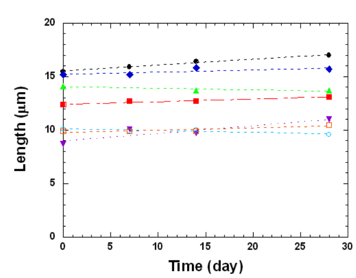

Fig.2 Etch pit spreading rates.