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SMP055-08 会場:ファンクションルームB 時間: 5月23日15:45-16:00

接触変成帯における方解石の顕微赤外・ラマンシフトと変成温度

Infrared and Raman shifts of calcite in contact aureole: An application for solvus geothermometer

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The calcite-dolomite solvus geothermometer is one of the widely used methods for the estimation of metamorphic temperature. The equilibrium Mg/(Mg+Ca) ratio of calcite ($CaCO_3$) coexisting with dolomite($CaMg(CO_3)_2$) increases with increasing tempareture, and is written by the following equation(1): log ($MgCO_3$mol% in calcite)= 1.727 x 10^{-3}T - 0.223 (400°C<T<1075°C). The infrared (IR) and Raman spectra vary between calcite and dolomite, however, systematic study of solid solution in the calcite-dolomite system has not been studied enough yet. This study demonstrates the IR and Raman spectral variations in the calcite-dolomite solid solution system using by the Fourier transform infrared micro-spectroscopy and laser Raman micro-spectroscopy. The calcite sample was taken in the Kasuga area, Gifu prefecture, southwestern Japan. The area comprises Paleozoic formation consisting of sandstone, basic volcanic rocks, limestone, dolostone, chert, and the Cretaceous Kaizuki-yama granite. The thermal metamorphism by the granite is recognized about 3km away from the contact(2). Metamorphosed limestone samples were taken from the points where have been determined the metamorphic temperature (400°C-630°C) by Suzuki(2). For IR transmission spectroscopy, thin sections of limestone samples were prepared with the thickness from 50 to 100 um. Both surfaces of the thin sections were polished using an alundum powder (4 um). For Raman spectroscopy, specimens were polished using a diamond paste. The v4 IR absorption bands of calcite and dolomite are 713 $cm^{-1}$and 731 cm^{-1}, and the v4 Raman shift of calcite and dolomite are 712 $cm^{-1}$and 724 cm^{-1}. With the increase of metamorphic temperature (400 °C<T<620°C), the v4 band of calcite shifts from 713.2 $cm^{-1}$to 717.0 cm^{-1}in IR and from 712.0 $cm^{-1}$to 713.5 cm^{-1}in Raman spectrum. The peak shifts of calcite v4 are 0.9 cm^{-1}/ mol % $MgCO_3$for IR, and 0.4 cm^{-1}/ mol % $MgCO_3$for Raman bands.
(1) Anovitz, L. M. and Essene, E. J., J. Petrol. 1987, 28, 389.
(2) Suzuki, K., Contrib. Mineral. Petrol. 1977, 61,79.

Keywords: calcite, dolomite, contact metamorphism, infrared spectrometer, laser Raman spectrometer, solvus geothermometer