Quantitative exploration of the system $MgCl_2$-H_2O using cryogenic Raman spectrum

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The fluid is play a very important role in geological processes. With respect to hydrothermal deposits, the composition and nature of ore-forming fluids is the key to understanding the mechanism of mineralization. Raman spectroscopy can not analyze the ions such as Na^{+}, Ca^{2+}, Mg^{2+} and so on, but these ions are common in ore-forming fluids.

In this paper, we obtained Raman spectrum of $MgCl_2$ standard solutions with different concentrations (Fig.1). This experimental condition is rapidly cooling to -180°C and slow warming to observe hydrate formation process (that is manifested as a darkening of the vision in the microscope), and finally, rapidly cooling down to -180°C. Through the analysis of peak parameters, we has founded two quantitative relationships: (1) the peak intensity ratio (I_{3514}/I_{3090} and I_{3401}/I_{3090} and I_{3464}/I_{3090}) and concentration; (2) the total integration area of $MgCl_2$ hydrate peaks (the total integration area of 3401、3464、3514cm^{-1})and the concentration. These findings are important to quantitatively analyze the $MgCl_2$ by Raman spectroscopy in natural inclusions.

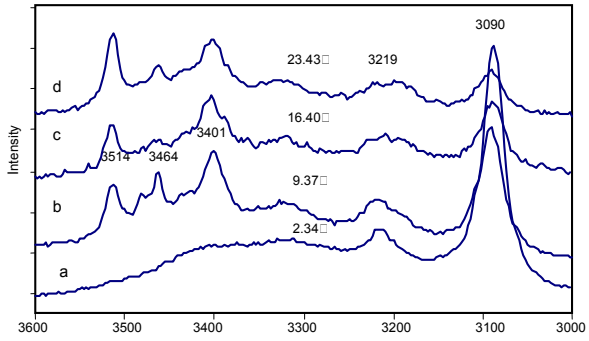

Figure 1 Raman spectrum of $MgCl_2$-H_2O with different concentrations at -180°C(experimental conditions as described in the text; 3401、3464、3514$cm^{-1}$is $MgCl_2$ hydrate peaks, 3090cm^{-1} is ice peak)

Chronology of detrital zircons from Jurassic sandstones in Western Shandong Province, China: Constraints on the nature of the Tan–Lu Fault Zone

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It has been controversial when the large-scale sinistral strike-slip of the Tan–Lu Fault Zone occurred, while LA-ICP-MS U-Pb dating data of the detrital zircons from the Jurassic sandstones in the western Shandong Province provides constraints on this issue. The dating results indicate that the detrital zircons from the Early-Middle Jurassic Fangzi Formation in the Mengyin and Zhoucun basins have age populations of 2452, 1950-2050, 1755, 431, 315, 282, 227, 171 Ma, and 2494, 1844, 322, 273, 223, 159 Ma, respectively, whereas ones from the Middle-Late Jurassic Santai Formation in the Mengyin and Pingyi basins are dominated by the 2519, 1883, 277, 191, 150 Ma, and 2558, 607, 181, 137 Ma, respectively. The former suggests that the sedimentary rocks from the Fangzi Formation formed after 159-171 Ma, the latter implies that deposition of the Santai Formation took place after 137-150 Ma. In addition, the detrital zircons with ages of 218-244 Ma (mean=225±3 Ma, MSWD=0.6, n=22) from the Early-Middle Jurassic Fangzi Formation display typical growth zoning and have high Th/U ratios (generally >0.51), suggesting a magmatic origin. These Triassic detrital zircons are in age similar to emplacement ages (205-225 Ma) of post-collisional Shidao complex within the Sulu Orogen. Based on the regional geology, it is suggested that the latter is the only source of the Triassic detrital zircons. Therefore, we conclude that the Sulu Orogen had located in the present position during the Middle-Late Jurassic, i.e., the large-scale sinistral strike-slip movement of the Tan–Lu Fault Zone did not happen in the Early Cretaceous.

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