環状炭化水素を包接した構造H型ガスハイドレートのラマン分光分析
Raman spectroscopic analysis of structure H gas hydrates encapsulating cyclic hydrocarbons

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Clathrate hydrates are crystalline inclusion compounds that consist of well-defined cages formed by water molecules and guest molecules of suitable sizes and shapes trapped in the cages. Clathrate hydrates including natural gases as guest molecules are commonly known as gas hydrates. Gas hydrates in sea or lake bottom sediments and permafrost layers have attracted considerable interest as a potential source of unconventional natural gas. There are three common crystallographic structure of hydrates, structure I (sI), structure II (sII) and structure H (sH). In the case of microbially sourced gas hydrate system, the gas hydrates are generally sI CH_4 hydrates. On the other hand, sH hydrate was found at northern Cascadia margin, where thermogenic larger hydrocarbons exist [Lu et al. 2007]. For instance,, cyclohexane (CH), methylcyclopentane (MCP), methylcyclohexane (MCH) and other large hydrocarbons, which is capable of forming sH hydrate with help gas like CH_4, were detected at the area. From the above, study for sH hydrate which encapsulating these large hydrocarbons are important for further understanding of natural gas hydrates.

In this study, sH CH_4 and larger cyclic hydrocarbon (CH, MCP and MCH) mixed hydrates were prepared. We observed the variations of Raman spectra of these cyclic hydrocarbons due to enclathrated water cages of gas hydrate. C–H and C–C stretching regions of enclathrated these cyclic hydrocarbons were measured by the Raman spectroscopic method., The Raman spectra of C–C stretching region of these hydrocarbon are useful for identification of guest molecules in natural gas hydrates because the number of Raman peaks of C–C stretching region are smaller than that of C–H stretching region.

Reference

Lu *et al.* (2007) Effect of temperature and large guest molecules on the C–H symmetric stretching vibrational frequencies of methane in structure H and I clathrate hydrates. *Nature*. **8**: 303-306.

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