

Kinetic Study of Structural Metastability Occurrence on Gas hydrates

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Despite the industrial importance and potential as energy source, formation mechanism and abnormal phase transition were understood poorly. Especially, there has been no reports related sH hydrates because of irregular distribution of gas hydrate phases, contrary to sI and sII have been invested widely. To understand the formation mechanism and transformation fundamentals occurring in deep-sea sediments, here, we, for the first time, successfully identify the kinetic preference of coexisting sI, sII and sH phases. Considering the significant change of the specific cage population as time elapses, we attempted to address the following three key issues through this communication. (1) Why is sII kinetically preferred at the initial stage of formation? (2) Why is the sI kinetically retarded over the sH? (3) How does the size of large guest molecule (LGM) affect the kinetic behaviour of gas hydrate phases? We expect that these new findings contribute to the understanding of inclusion phenomena occurring in the cages of host-guest framework and structural metastability observed in deep-sea methane hydrate sediments.