

Methane hydrate formation and replacement mechanism in heterogeneous clay system

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Gas hydrate, which has been expected to replace petroleum energy, exists on the continental margins and in permafrost regions. The amount of world gas hydrate is estimated more than twice as fossil fuel's. If we could replace natural gas in hydrate with carbon dioxide, natural gas hydrate deposits would serve as energy source as well as carbon dioxide storage site. Many researches about replacement have been fulfilled under homogeneous condition, but not considering the role of surrounding heterogeneous phase incorporated with clay minerals. In this study, we identify the natural phenomenon of methane hydrate formation in heterogeneous clay layer and its replacement mechanism through spectroscopic identification such as solid-state NMR, Raman spectroscopy, TEM and XRD.