Carbon Dioxide Capture and Storage Using Gas Hydrate Formation

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This study is focused on carbon dioxide capture and storage technologies using gas hydrate formation. The emission of carbon dioxide from the fossil-fueled power plants has been regarded as the major contributor to the global warming. One of the most promising options to capture CO2 from the flue gas (CO2 + N2) and fuel gas (CO2 + H2) mixtures is the hydrate-based method because CO2, whose hydrate equilibrium condition is remarkably milder than N2 or H2, is expected to be enriched in the hydrate phase, resulting in high selectivity of CO2 in the hydrate phase. On the other hand, industrially produced CO2 can be sequestered as crystalline gas hydrates in the deep ocean to prevent further release into the atmosphere. In addition, the swapping phenomenon occurring in the natural CH4 hydrate deposits and its potential application to CO2 sequestration is experimentally demostrated through spectroscopic analysis and heat of dissociation measurement.