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# **Gas Capture and Storage in MOFs in Water Rich Environment at High Pressure, Low Temperature Conditions**

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Metal-Organic Framework (MOFs) are known to have larger specific surface area and are considered as a promising material to improve CO<sub>2</sub> gas storage in hydrates under high pressure and low temperature conditions. Due to the large surface area, MOFs improve the gas-liquid interface and thus can enhance the overall gas storage. The novel application of MOF in gas separation and storage via hydrate phase is very new and there are many unknowns.

In this study, we tested MOF based on Cu and Zn to improve CO<sub>2</sub> storage in the hydrate phase. We used a high pressure differential scanning calorimeter and a high pressure reactor to study the CO<sub>2</sub> gas storage in hydrate phase. Further enhancement of gas storage in the hydrate was tested in the presence of a kinetic promoter, including the amino acid L-methionine. The experiments were carried out at constant pressure and under different liquid/solid (L/S) ratios.

The results show an improvement in gas retention in the hydrate in the presence of promoters at a given pressure and L/S ratio. The effect was dependent on the size of the sample and the reactor design. The crystals were found to remain stable over multiple cycles of formation and dissociation, suggesting high reusability. Additional discussion will be presented during the talk.