

Endowed Research Section – Water Chemistry Energy (AGC) –

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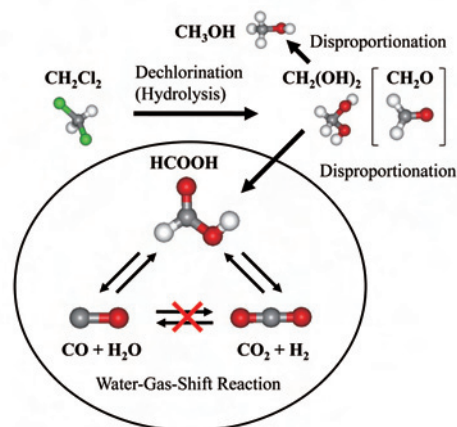
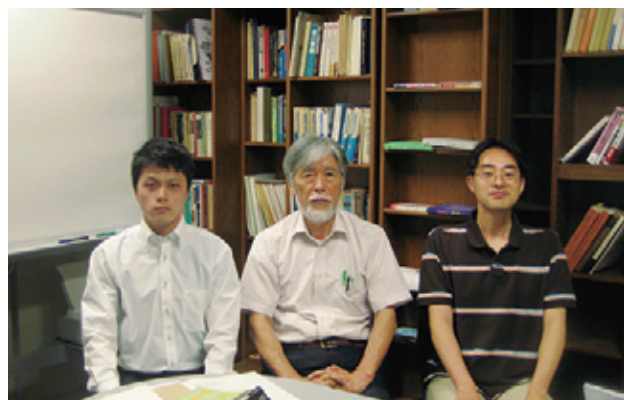
ISOBE, Akira

Scope of Research

Application of fundamental studies on decomposition and formation of formic acid to the hydrogen energy technology is under investigation using NMR, Raman, and IR spectroscopy. This hydrogen-water energy cycle does make a contribution to the CO₂ reduction and to a progress in energy-saving society. We are taking advantage of the solvation effect on the equilibrium of formic acid formation or decomposition from formic acid to capture and deposit CO₂ on a large scale. Fundamental aspects of pyrolysis of ethers (unimolecular reaction of ethers) are also investigated by NMR.

KEYWORDS

Formic Acid
Hydrogen
Carbon Dioxide
Water-Gas Shift Reaction
Carbon Neutral



Selected Publications

Yasaka Y, Wakai C, Matubayasi N, Nakahara M: Controlling the Equilibrium of Formic Acid with Hydrogen and Carbon Dioxide Using Ionic Liquid, *J. Phys. Chem. A*, **114**, 3510-3515 (2010).

Nakahara M, Tsujino Y, Yoshida K, Yasaka Y, Uosaki Y, Wakai C, Matubayasi N: Recent Advances in Studies on Organic Reactions in Water at High Temperatures and High Pressures, *Rev. High Pressure Sci. Technol.*, **20**, 40-49 (2010) (in Japanese).

Yasaka Y, Yoshida K, Wakai C, Matubayasi N, Nakahara M: Kinetics and Equilibrium Study on the Formic Acid Decomposition in Relation to the Water-Gas-Shift Reaction, *J. Phys. Chem. A*, **110**, 11082-11090 (2006).

Matubayasi N, Nakahara M: Hydrothermal Reactions of Small Compounds: Free-energy Analysis of Equilibrium, *J. Chem. Phys.*, **122**, 074509-074520 (2005).

Yoshida K, Matubayasi N, Uosaki Y, Nakahara M: Scaled Polynomial Expression for Self-Diffusion Coefficients for Water, Benzene, and Cyclohexane over a Wide Range of Temperatures and Densities, *J. Chem. Eng. Data*, **55**, 2815-2823 (2010).

