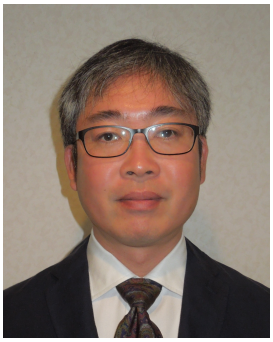
Requests for Collaboration

Name: Noritsugu, KOMETANI, Ph.D.
Current position: Professor
E-mail address: kometani@a-chem.eng.osaka-cu.ac.jp



Research Interests

- Reaction engineering and industrial application of subcritical and supercritical fluids
- Physicochemical study of biomass materials under high pressure
- Environmental application of photocatalysts

Creative Achievements in The Application of New and Existing Science and Technology

(1) Catalytic hydrothermal treatment of wastewater including refractory pollutants

We have found that hydrothermal oxidation of refractory organic pollutants can be remarkably enhanced using copper-based catalyst under subcritical condition of water at around 100-200°C and 1-30 MPa, because of accelerated Fenton-like reaction producing a large amount of •OH radicals. This allows us to treat wastewater containing refractory compounds at gentler reaction condition compared with conventional hydrothermal oxidation technique.

(2) Photocatalytic reduction of CO_2 in supercritical water/CO_2 mixture

Photocatalytic reduction of CO_2 by Pt-loaded TiO_2 has been examined in the mixture of CO_2 and water. The abrupt increase in the reaction efficiency was observed when the reaction condition was elevated beyond critical point of water, because of the formation of uniform single phase mixture of water and CO_2 under supercritical condition. It is suggested that the control of the phase state of reaction medium is crucial to improve the efficiency of the photocatalytic CO_2 reduction.

Technology (Product, Process, Device, Service etc.) That I Want to Request for Collaboration

- Techniques to control high-temperature high-pressure fluids
- Laser spectroscopy for subcritical and supercritical fluids
- Wastewater treatment

A List of 5 Key Publications

- N. Kometani, Takeshi Teranishi, "Preparation of size-controlled silver nanoparticles by the hydrothermal method", *Phys. Stat. Soli. C.*, Vol.7, pp.2644-2647 (2010).
- N. Kometani, Y. Sumiyoshi, "Enhancement of Hydrothermal Oxidation of Chlorobenzene by the Fenton-type Reaction Using Cu(II)-grafted Tungsten Trioxide Catalyst", *Chemistry Letters*, Vol.42, pp.804–806 (2013).
- A. Shimokawa, H. Honda, K. Nakao, N. Kometani, "Catalytic Hydrothermal Oxidation of p-Chlorophenol with Cu or Fe-Grafted TiO_2. Enhanced Decomposition by Fenton-Type Reaction", *Journal of Chemical Engineering of Japan*, Vol. 46, pp. 821–826 (2013).
- N. Kometani, A. Tai, "High Pressure Study of Rotational Dynamics of Perylene and Sodium 8-Methoxypyrene-1,3,6-Sulfonate in Imidazolium-based Ionic Liquids", *Journal of Solution Chemistry*, Vol.43, pp.1529-1538 (2014).
- N. Kometani, M. Tanabe, L. Su, K. Yang, K. Nishinari, "In Situ Observations of Thermoreversible Gelation and Phase Separation of Agarose and Methylcellulose Solutions under High Pressure", *J. Phys. Chem. B*, Vol.119, pp 6878–6883 (2015).
- N. Kometani, S. Hirata, M. Chikada, "Photocatalytic Reduction of CO_2 by Pt-Loaded TiO_2 in the Mixture of Sub- and Supercritical Water and CO_2", *J. Supercritical Fluids*, Vol.120, pp.443-447 (2017).