Department of Applied Biological Chemistry

Laboratory of Biophysical Chemistry

STAFF	Professor Masaharu OHBA	Associate Professor Masahiro MAEBAYASHI
TEACHING	Physical Chemistry I & II	Analytical Chemistry
	Bio-physical Chemistry	Instrumental Analysis
	Advanced Biophysical Chemistry (MC)	Advanced Biophysical Chemistry (MC)

Professor Masaharu OHBA

Associate Professor Masahiro MAEBAYASHI

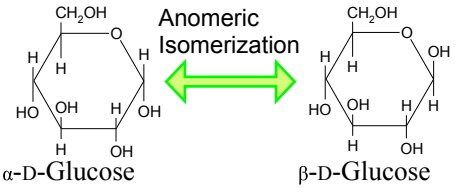
Research

Biophysical Chemistry

To study the life phenomena and biologically relevant materials by using physico chemical methods.

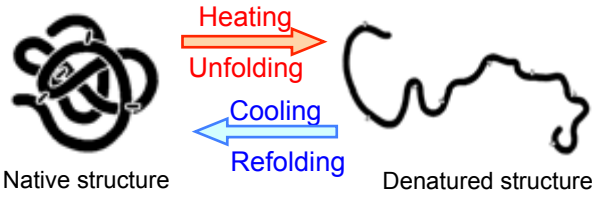
Behavior of biologically-relevant molecules in aqueous solutions

Life was born in the magical liquid "water". We can never discover the essence of life without understanding the relationship between water molecules and organic compounds. We are now investigating spontaneous structure changes of organic compounds, such as sugars and proteins, in aqueous solutions through the measurements of thermodynamic quantities of the compounds dissolved in the aqueous solutions.



K^+, Rb^+ and Ce^+ affect the anomeric proportion

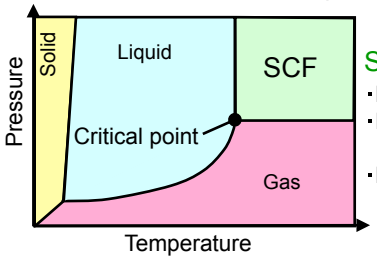
Structure change of glucose in alkali chloride aqueous solutions.



Unfolding and refolding of a protein molecule

Elucidation of the properties of supercritical fluids and reactions in these fluids

The properties of the supercritical fluids have been applied in the fields of agriculture such as food chemistry and pesticide chemistry. We are investigating theoretically and experimentally the properties and the reaction in the supercritical fluids.

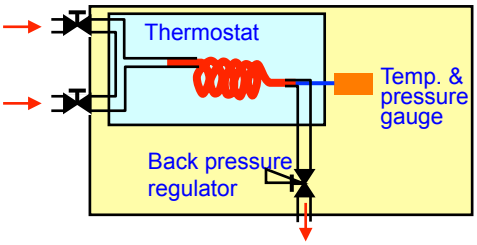


Phase diagram

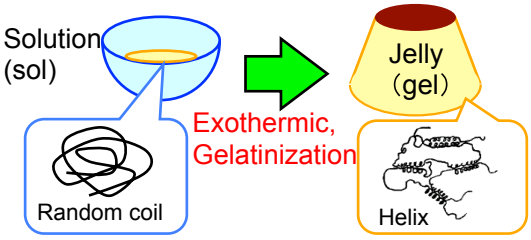
Supercritical fluids(SCF)

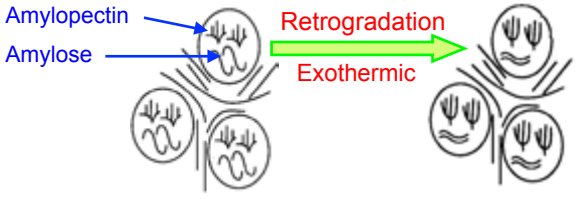
- Neither liquid nor gas.
- Higher pressure and temperature than the critical point.
- Density, viscosity, diffusivity etc. can be varied continuously.

Reactor for high pressure and temperature



Thermal and viscoelastic evaluations for food in its manufacturing and degeneration processes





Starch retrogradation in cooked rice and bread

We are investigating thermal and viscoelastic properties of food change in the processing and degeneration processes such as the gelatinization of solutions and the retrogradation of starch, focusing on the relationship of those properties and the conditions and quality of the food through the real-time measurements.

Recent publications:

- Ohba, M., M. Maebayashi, S. Harada and H. Sahara, (2008) The Retrograding Process of Cooked Rice and Bread - The Analysis of the Thermal Output by the Monte-Carlo Simulation. *J. Res. Institute of Meijo Univ.*, **7**: 61-69. (in Japanese)
- Maebayashi, M., S. Koda and M. Ohba (2008) Acoustic Analysis of Boundary Layers within Polymeric Composite Materials Containing Inorganic Small Particles. *Netsu Sokutei*, 35(2): 82-92. (in Japanese)
- Y. Asakura, M. Maebayashi and S. Koda, (2007) Characterization of Sonochemical Reactors by Chemical Dosimetry, *Electron. Comm. Jpn. III*, 90, 1-8.
- T. Matsuoka, Y. Nakamura, M. Maebayashi and S. Koda, (2006) Surface Wave Velocity in Methylcellulose Hydrogel in the Drying Process, *J. Chem. Eng. Jpn.*, 39, 864-868.
- M. Maebayashi, M. Endo, T. Matsuoka, S. Koda and Y. Isono, (2006) " Acoustic Analysis of Bound Rubber Formed in Silica/SBR Compounds ", *Ultrasonics*, 44, E1101-E-1104.
- Ohba M. (2004) The Th ermodynamic and Spectroscopic Study on the Solvation of the Glucose and Its Linear Origomers. *Bull. Res. Institute of Meijo Univ.*, 9: 93-98. (in Japanese)
- T. Takigawa, M. Ohba, H. Ogawa, S. Murakami, (2003) "Thermodynamic properties of binary mixtures of hexane isomer and cyclohexane at 298.15K", *Fluid Phase Equilibria*, 204, 119-130.