

Department of Applied Biological Chemistry

Laboratory of Biological Physical Chemistry



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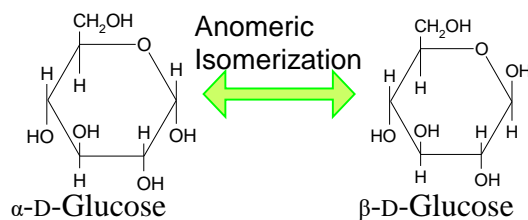
STAFF	Professor Masahiro MAEBAYASHI	Associate Professor Ken-ichi AMANO
TEACHING	Analytical Chemistry Analytical Chemistry Instrumental Rheology for Polymer Solutions and Materials	Physical Chemistry I Physical Chemistry II Biological Physical Chemistry

Biophysical Chemistry

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

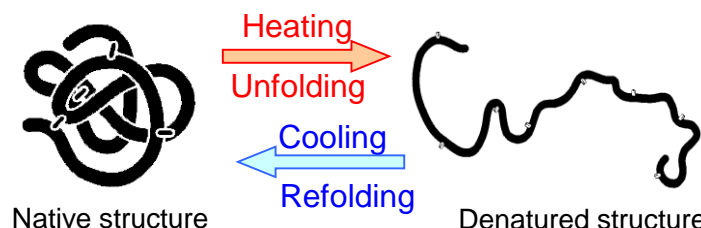
Behavior of the biologically-relevant molecules in aqueous solutions

Life was born in the magical liquid "water". We can never discover the essence of life without understanding relationship between the water molecules and the 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

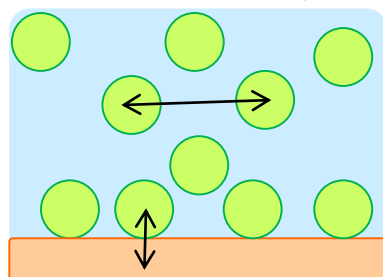
Structure change of glucose in alkali chloride aqueous solutions.



Unfolding and refolding of a protein molecule

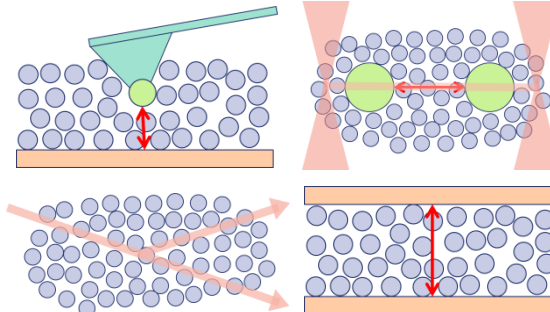
Fundamental and applied sciences of colloidal particles

Interactions and adsorptions



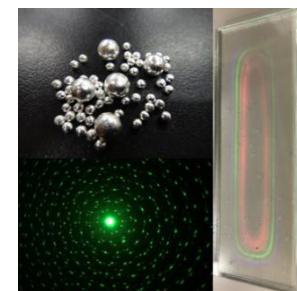
Calculations of the interaction and the physical adsorption

Developments of inverse theories



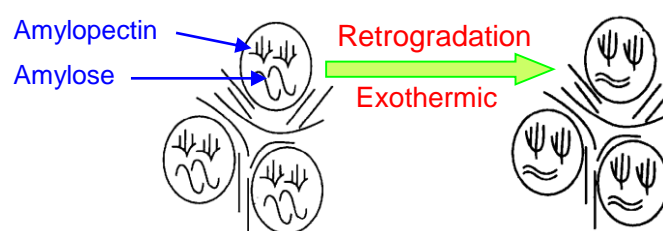
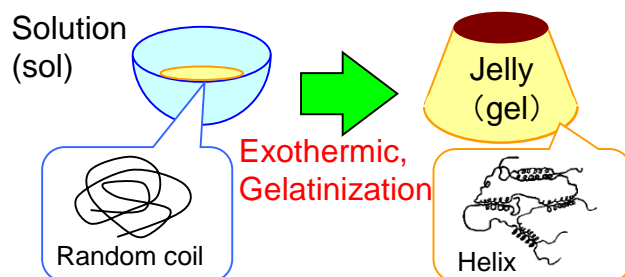
Calculation of the density distributions and the interaction from the experimental data

Metal allergy free material



Development of the glossy and edible material

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



Starch retrogradation in cooked rice and bread

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

Recent publications:

- Amano, K., *et al.* (2021) Theoretical correction methods for optical tweezers: Acquisition of potentials of mean forces between colloidal particles in a bulk and on a substrate surface. *J. Res. Inst. Meijo Univ.*, **20**, 17-26.
- Amano, K., *et al.* (2020) An improved model-potential-free analysis of the structure factor obtained from a small-angle scattering: acquisitions of the pair distribution function and the pair potential. *Chem. Lett.*, **49**, 1017-1021.
- Fang, G.S., *et al.* (2018) The contour of excess molar enthalpy at a mole fraction of benzene $x = 0.548$ on the $p - T$ plane in liquid state and near the critical points for the (benzene + cyclohexane) mixture. *J. Chem. Thermodyn.*, **120**, 33-38.
- Maebayashi, M., *et al.* (2018) Anomeric proportions of D-glucopyranose at the equilibrium determined from ¹H-NMR spectra II. Effects of alkali metal chlorides, CaCl₂ and BaCl₂, on the anomeric equilibrium at 25.0 °C. *J. Mol. Liq.*, **252**, 236-244.
- Maebayashi, M., *et al.* (2017) Anomeric proportions of D-glucopyranose at the equilibrium determined from ¹H-NMR spectra I. Investigation of experimental conditions and concentration dependence at 25.0 °C. *J. Mol. Liq.*, **252**, 236-244.
- Amano, K., *et al.* (2016) Number density distribution of solvent molecules on a substrate: A transform theory for atomic force microscopy. *Phys. Chem. Chem. Phys.*, **18**, 15534-15544.
- Amano, K., *et al.* (2013) The relationship between local liquid density and force applied on a tip of atomic force microscope: a theoretical analysis for simple liquids. *J. Chem. Phys.*, **139**, 224710.