

Shirakashi LAB.

[Phase Change and Microscale Bio Thermal Engineering]

Department of Mechanical and Biofunctional Systems

Phase Change Engineering

School of Engineering, Department of Mechanical Engineering

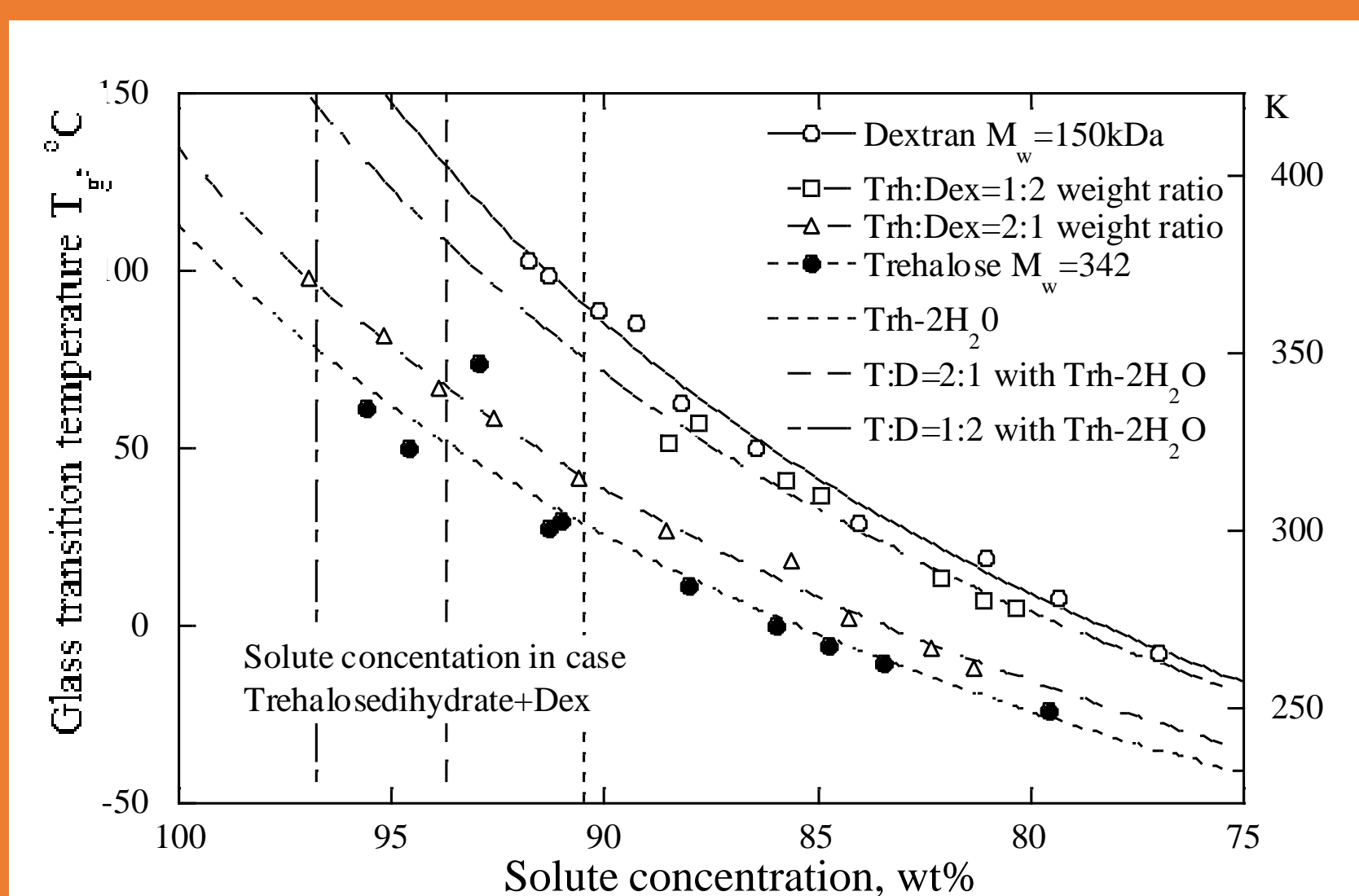
<https://www.iis.u-tokyo.ac.jp/~aa21150>

Long Storage of Clinical Analytes and Pharmaceutical Proteins in High Quality (Molecular Thermal Engineering and Bound water)

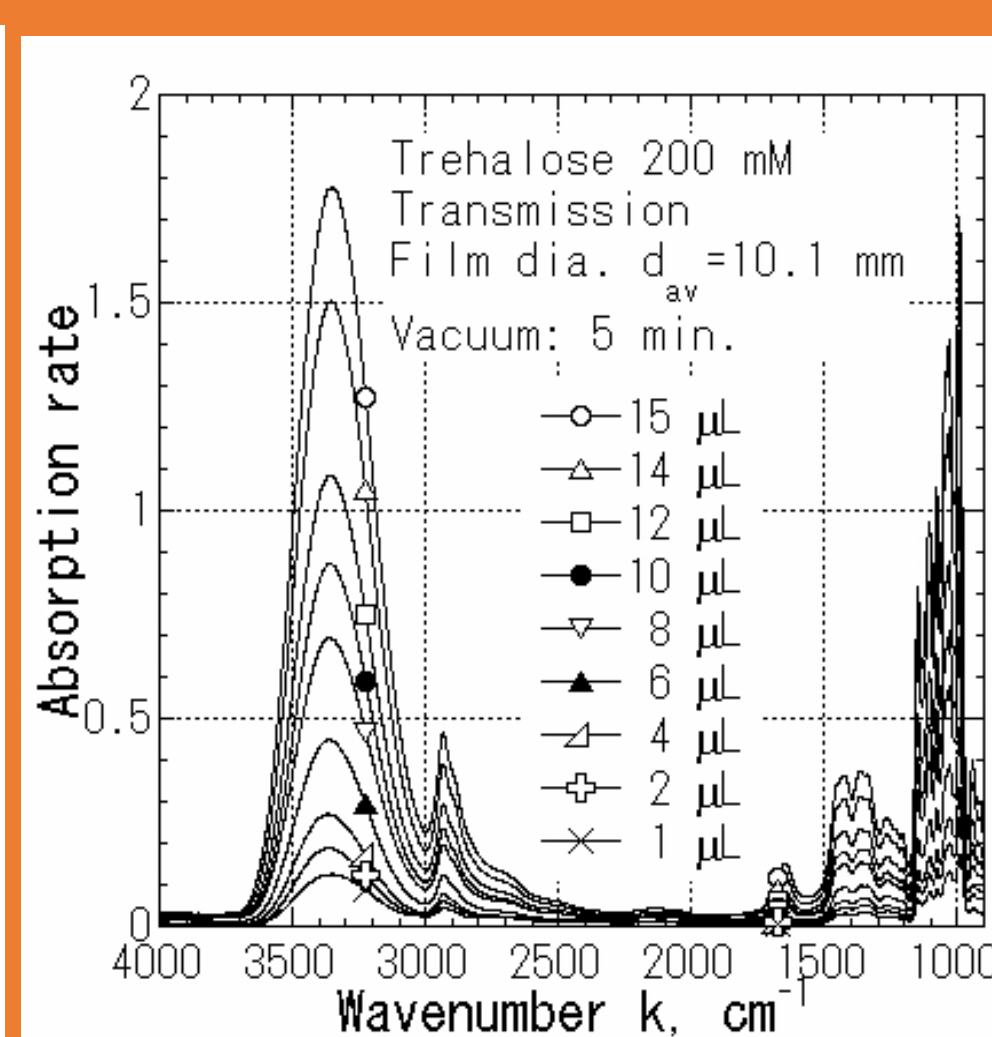
Degeneration and desiccation of biomolecules

Biomolecules in clinical analytes include plenty of biomarker molecules and nucleic acids, which are the important information sources for personalized health control and medicine. The preservation of the Biomolecules that are included in pharmaceuticals as well as these clinical analytes is of importance, because they degenerate immediately after their purification or collection. We focus on studying the method for preserving such biomolecules with the room temperature desiccation.

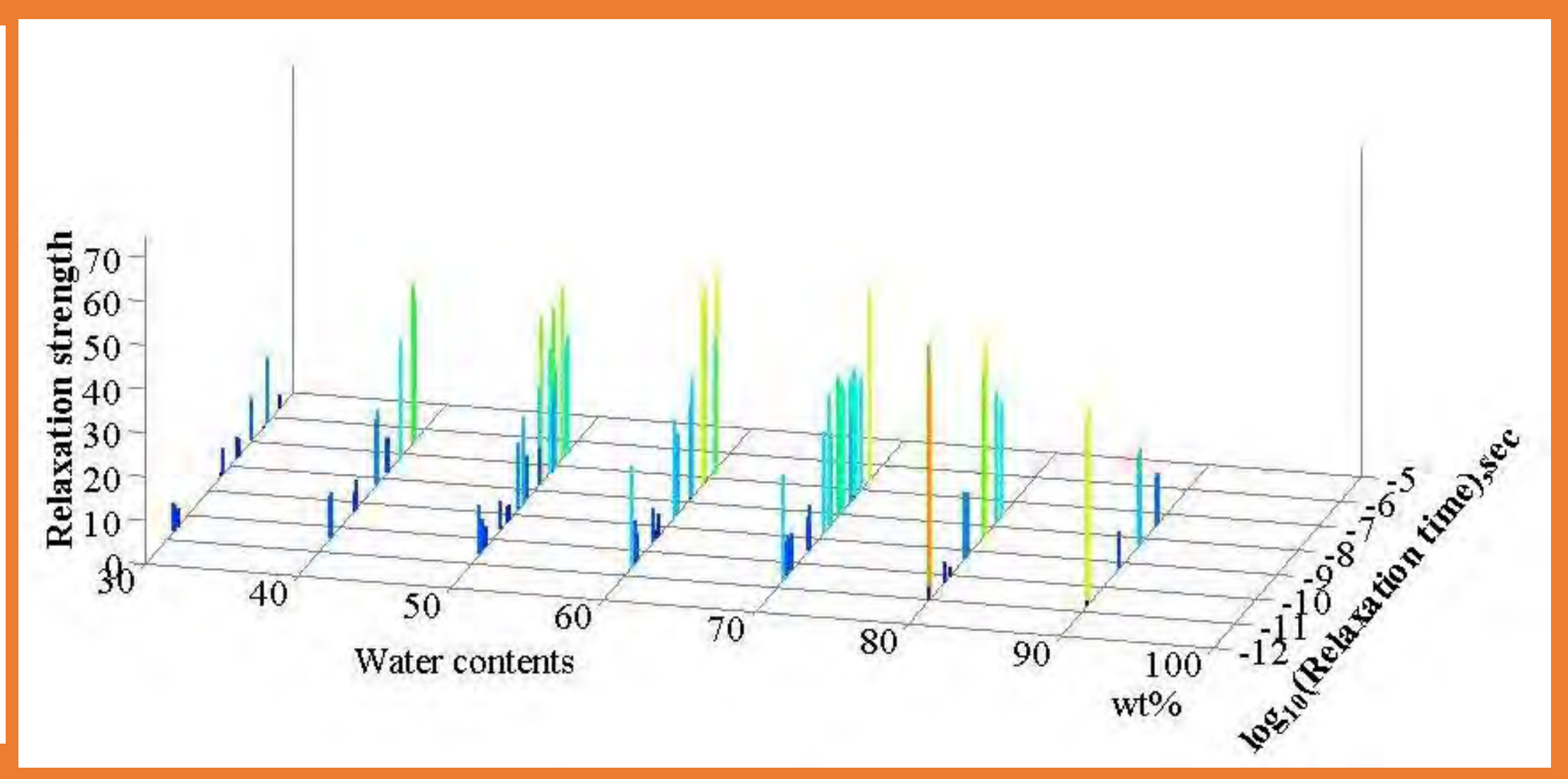
- ◆ Vitrification by the rapid-drying at room temperature
- ◆ Measuring the relaxation time of bound water molecules
- ◆ Predicting the shelf-life of biomarker proteins



Glass transition temperature and concentration of protective agent



IR spectra of vitrified protective agents



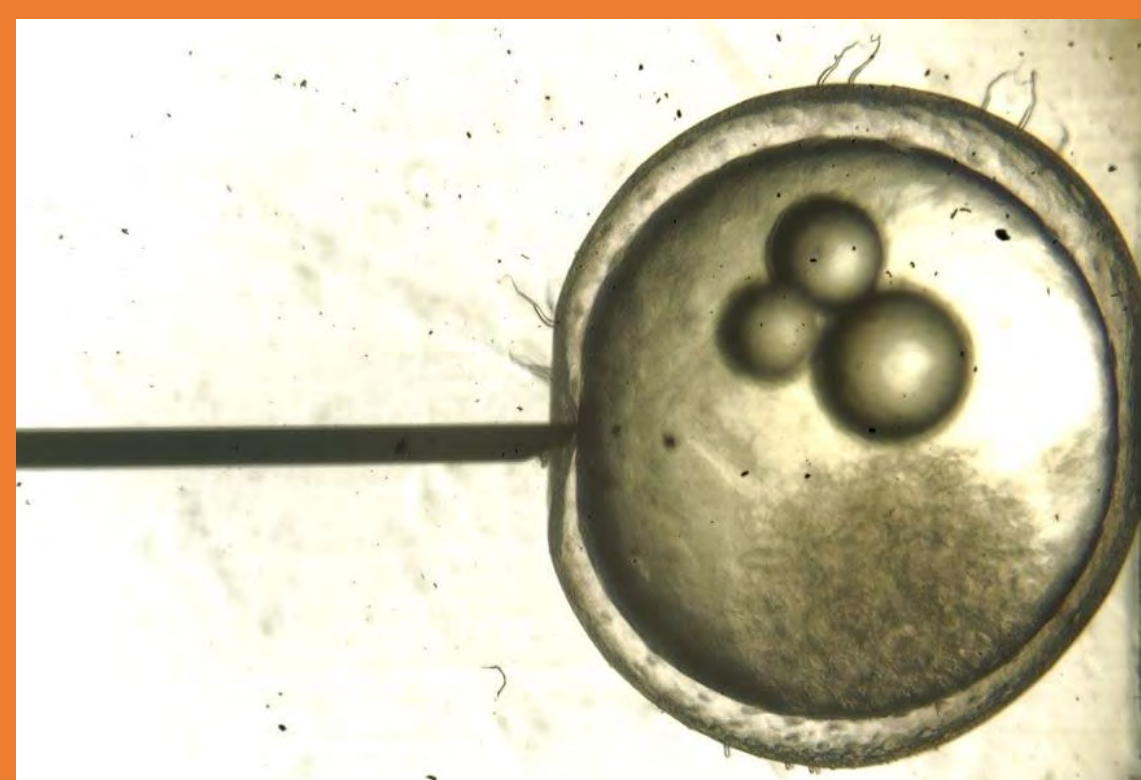
Retained water ratio and dielectric relaxation time distributions of protein solution

Long Storage of Fish Eggs in High Quality (Electro-piercing)

High Quality Biopreservation for Aquafarming

Sustainable aquafarming is an important option for balancing living aquatic resources and food resources. The preservation of fish eggs that keeps hatching ability after the long storage is a dream technology for the sustainable aquafarming, which enable the seedling production especially effective for rare species.

- ◆ Loading a fish egg with protective agents by the high through put method of electro-piercing



Injecting protective agents into a fish egg by immobile needle using electro-piercing (left: Before the electric pulse, center: during the pulse, right: after the pulse)