Shirakashi LAB.

[Technology for Preservation of Biological Systems]

Department of Mechanical and Biofunctional Systems

Phase Change Thermal Engineering

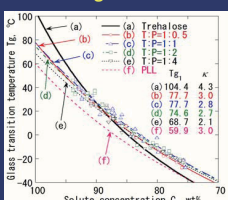
School of Engineering, Department of Mechanical Engineering http://www.iis.u-tokyo.ac.jp/~aa21150/indexe.html

Improving the shelf life of Clinical Analytes and Bio Pharmaceuticals at Room Temperature (Thermal Engineering meets Water in Biological System)

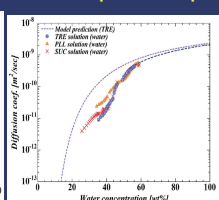
Deterioration and desiccation of biomolecules

Biomolecules in clinical analytes include plenty of biomarker molecules and nucleic acids, which are the important information sources for personalized health control and medicine. Technology for improving the "***shelf life***" of such biomolecules that compose bio-pharmaceuticals as well as clinical analytes is of importance for their logistics, because such molecules deteriorate immediately after their purification or collection. We have been focusing on the method for preserving these biomolecules with the room temperature desiccation.

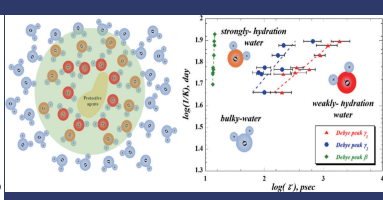
- **Vitrifying samples with the room temperature desiccation for a long shelf-life**
- **Protective agents control the water molecular rotational relaxation time and transport properties**
- **Predicting the shelf-life of biomarker proteins in preservative solution**



Glass transition temperature and concentration of protective agent



Water diffusion coefficients in supersaturated preservative solution



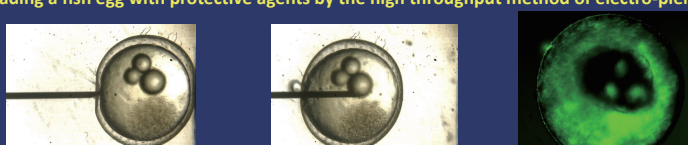
Water molecular rotational relaxation time in preservative solution and corresponding shelf-life of biomarker protein

Long Shelf-life 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 hutching 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 throughput method of electro-piercing**



Injecting protective agents into a fish egg by immobile needle using electro-piercing
(left: Before the electric pulse, center: after the pulse, right: after freeze-thawing; dark part depics embryonic cells)