

# SHIRAKASHI LAB.

## [Advanced Technologies for Biopreservation]

Department of Mechanical and Biofunctional Systems

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Mechanical  
engineering  
department

### Phase Change Thermal Engineering

## Preserving cells and biomolecules ~ in a high quality and for a long term ~

High Quality Biopreservation for Medical Diagnosis and Aquafarming

High quality and adequate quantity of analyte from patients, as well as biochips that detect protein/DNA are critical factors for the future personalized medicine.

Sustainable aquafarming, like fully sustainable stockbreeding, is a dream technology for the food sustainability. The long-term preservation of embryonic fish egg is a challenging and a critical technology for the well scheduled and controlled aquafarming.

Dehydration or immobilizing water in these biological specimen (cell, protein and gene) by freezing or drying enables the high-quality long-term preservation. For these process, we are developing the method for screening and the uniform introduction of lyo-/cryo-protective agents, and the control process of water in biological specimen.

- ◆ Electropiercing for loading embryonic fish egg with lyo-/cryo-protective agents
- ◆ Screening lyo-/cryo-protective agents: bound water analysis and glass transition
- ◆ Electrorotation for monitoring the development of embryonic fish egg

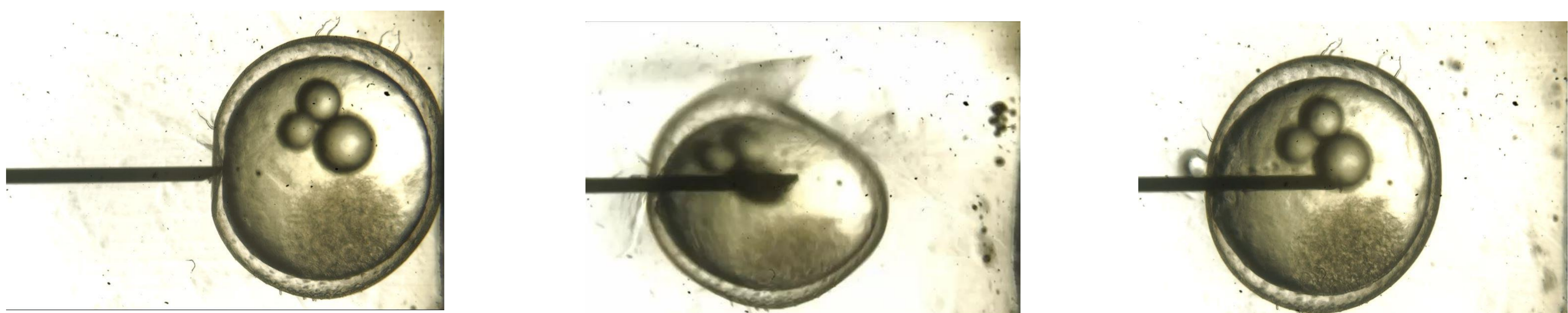


Fig.1 Electropiercing of a fish egg (left: before pulsing, center: during pulse, right: after pulsing)

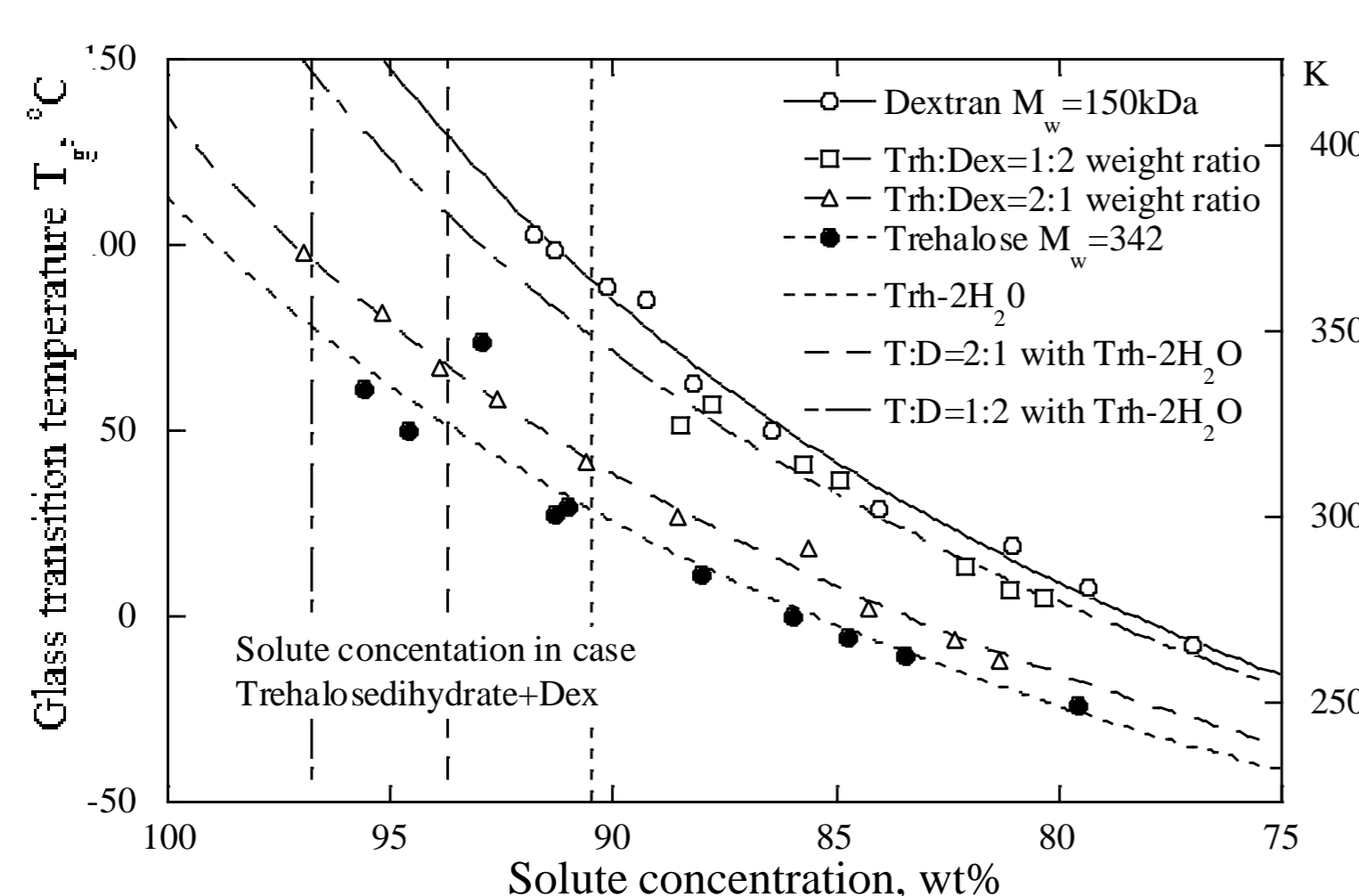


Fig.1 Glass transition diagram of protective agents

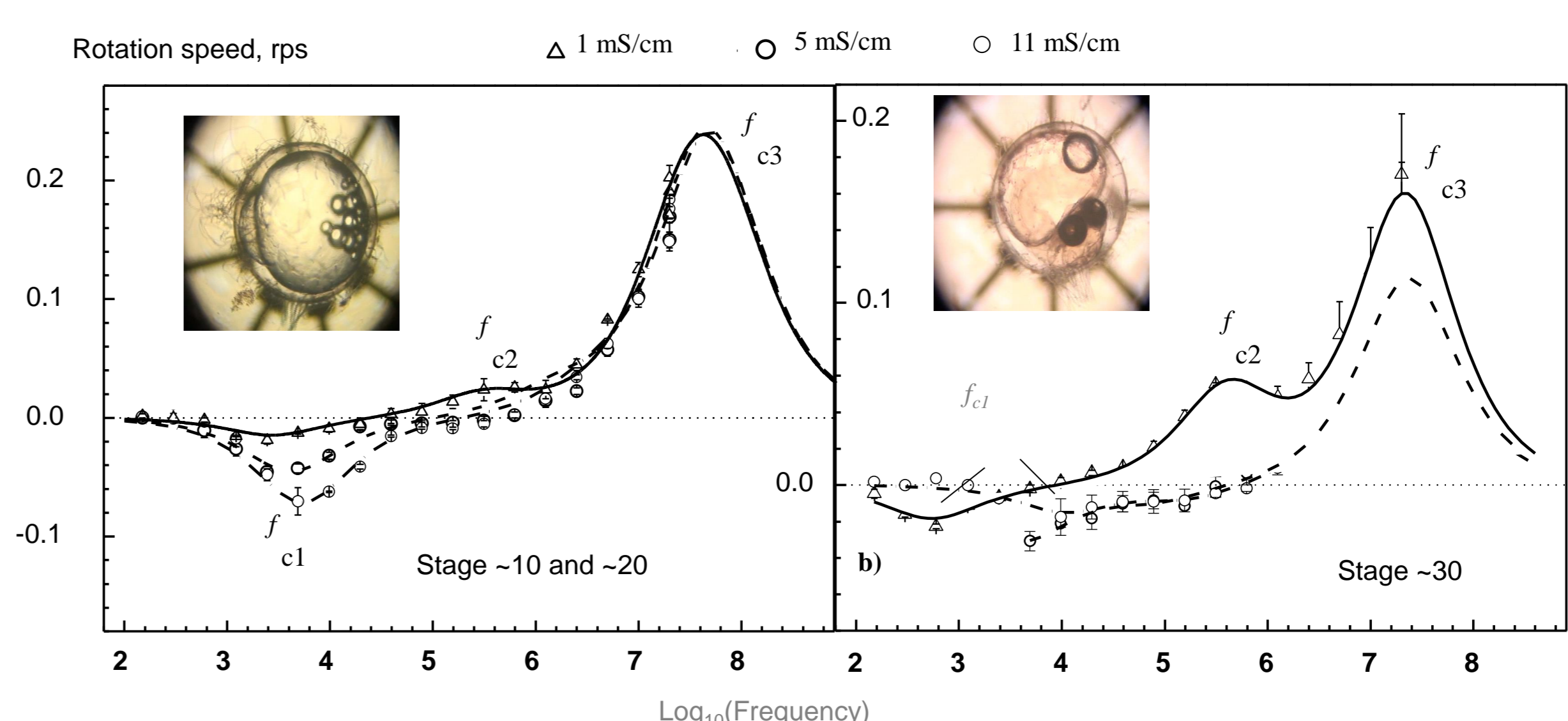


Fig.3 Electrorotation spectra of single fish egg