

SHIRAKASHI LAB.

High Quality Preservation
of Biological Matters
- Exploring Biological Water by Spectroscopy

Department of Mechanical and Biofunctional Systems

Phase Change Thermal Engineering

Department of Mechanical Engineering, Graduate School of Engineering

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

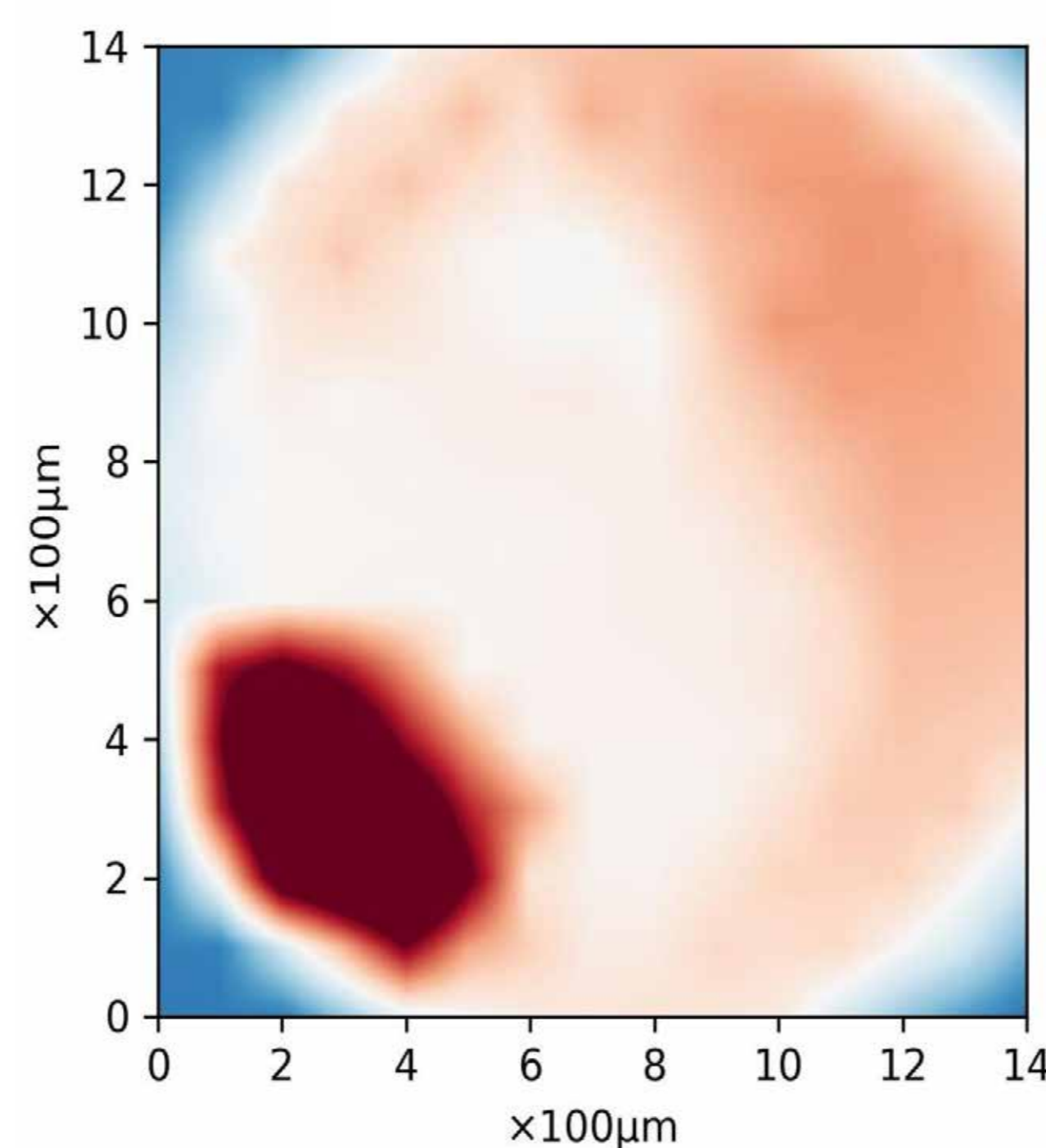
Biological matters never exist without water. Water in biological system is in a state different from that of bulk water because it interacts with various biomolecules in biological system. We are measuring this unique state of water by Dielectric Spectroscopy and Infrared Spectroscopy to pursue a better state of water for biopreservation.

The state of water in fish egg and differentiation ability

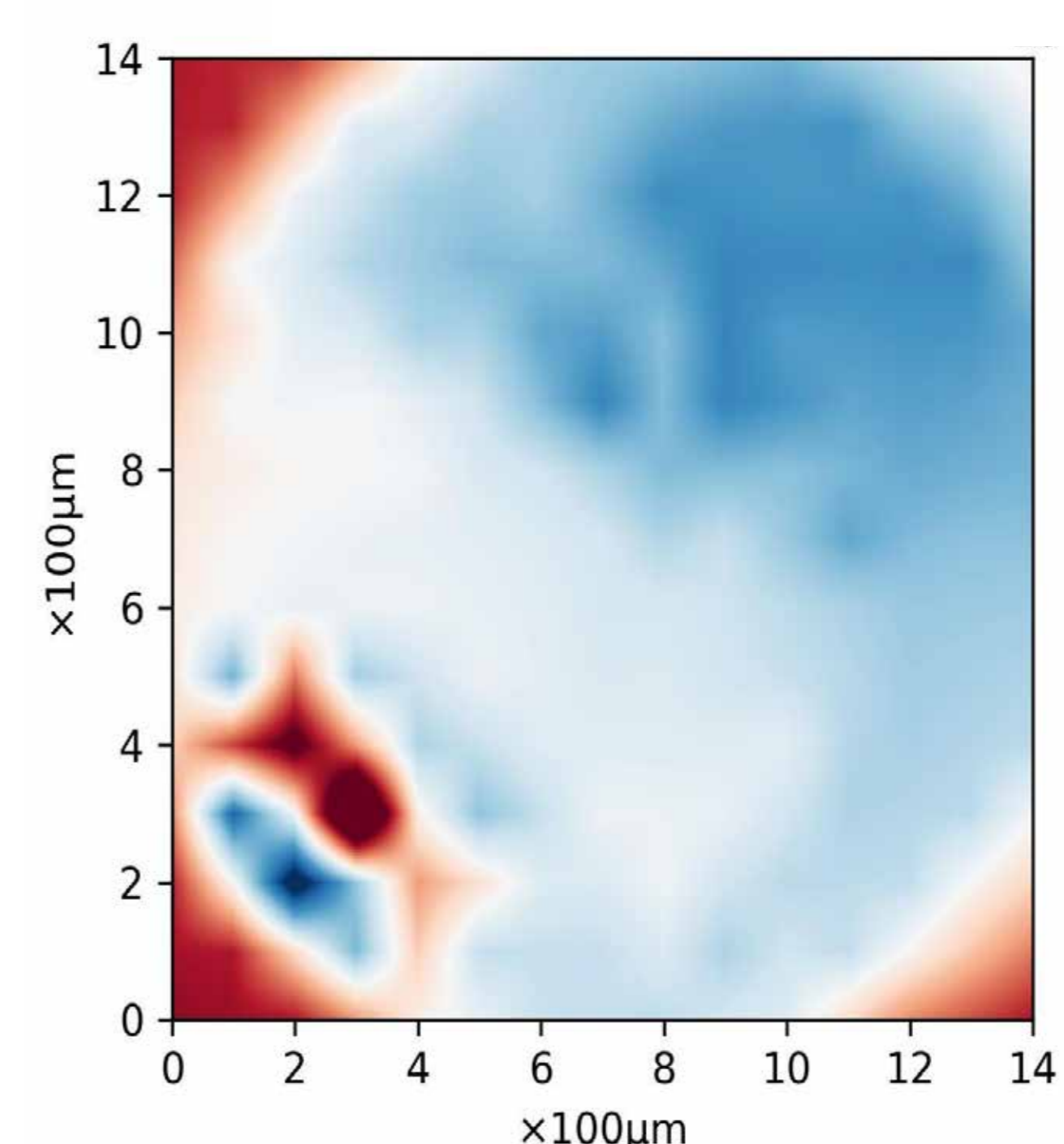
Farmed fishes can be provided throughout the year if their hatching can be shifted to their in-spawning season. We try to estimate the differentiation ability of fish egg by measuring the state of water (Water molarity, molecular rotational relaxation time).



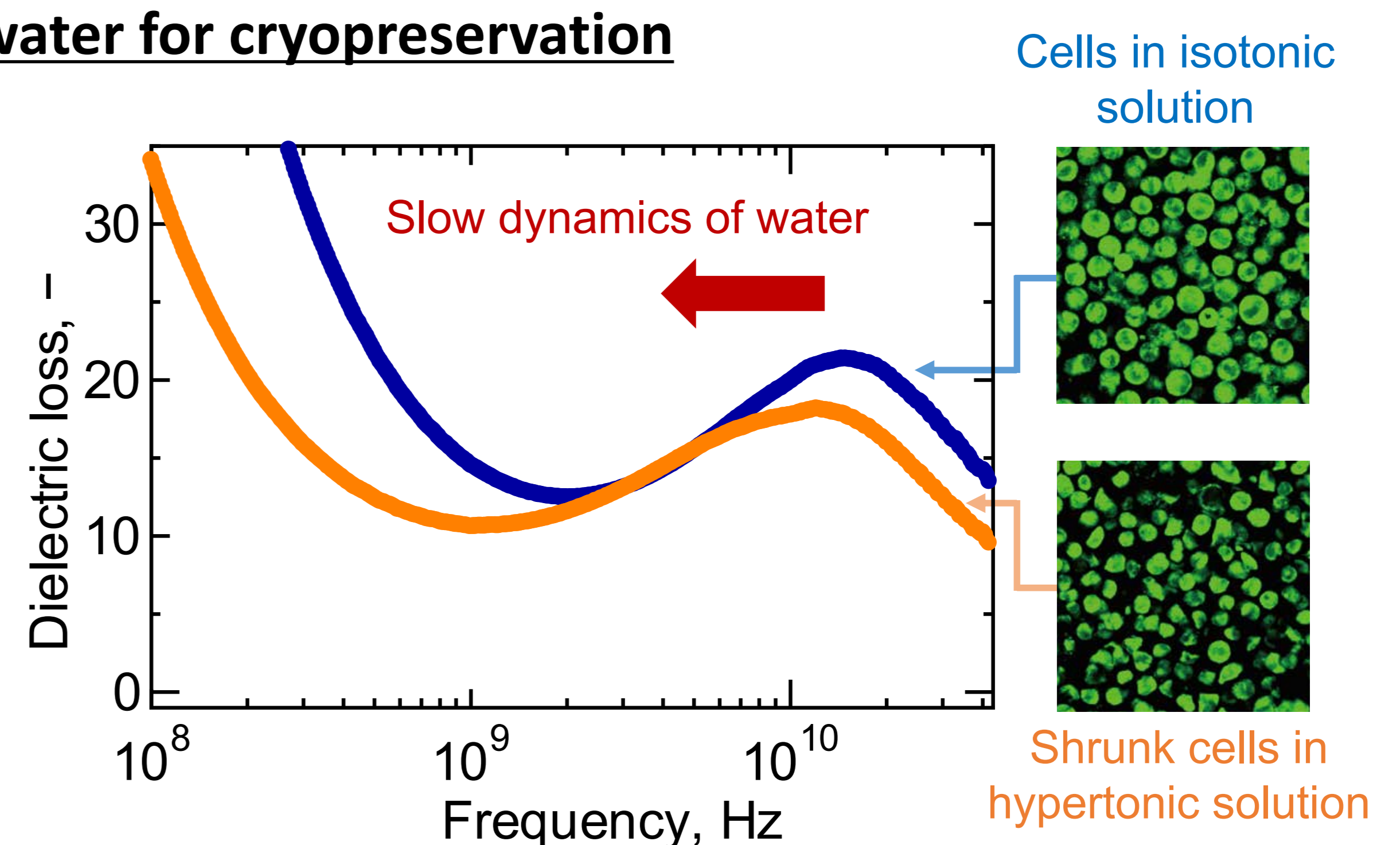
Fertilized Medaka fish egg



Distribution of water molarity

Distribution of
water rotational relaxation time**Measurement of slow dynamics of Intracellular water for cryopreservation**

In cryopreservation, an understanding of the dynamics of water molecules in cells is crucial for avoiding the fatal freezing injuries. We measure the picosecond orientational dynamics of intracellular water by dielectric spectroscopy, with the aim of contributing the development of optimized cryopreservation protocols.



Dielectric spectrum of intracellular water