

SHIRAKASHI LAB.

[Bound Water and Preservation of Biological System]

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Phase Change Thermal Engineering

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Bound Water in Biosystem

Water stabilizing our physiological function ~Bound Water~:
revealing its performance and making use of it for a long term biopreservation

All the physiological phenomena, from insensitive water loss of skin to antigen-antibody complex reactions, are mediated by water in our body. Especially water directly interacting with bio-molecules, "bound water", plays essential roles for physiological performances. Namely, "bound water" keeps biomaterials fresh by stabilizing bio-molecules.

We are trying to detect "bound water" by the feasible method of dielectric spectroscopy and to associate the dielectric spectra with actual functions of "bound water", such as desiccation tolerance and frost durability.

- ◆ **Measuring the amount and kinetics of bound water:** Feasible lyoprotectants screening for biopreservation, diagnosis of desiccation tolerance of skin with cosmetics.
- ◆ **Long term lyopreservation of biosystems:** Mimicking anhydrobiosis of wild creatures for the nonperishable and reasonable preservation of biochips, blood cells, stem cells, fish oocytes etc.

Measurement of Bound Water



Fig.1 Gelatin gel of various water contents

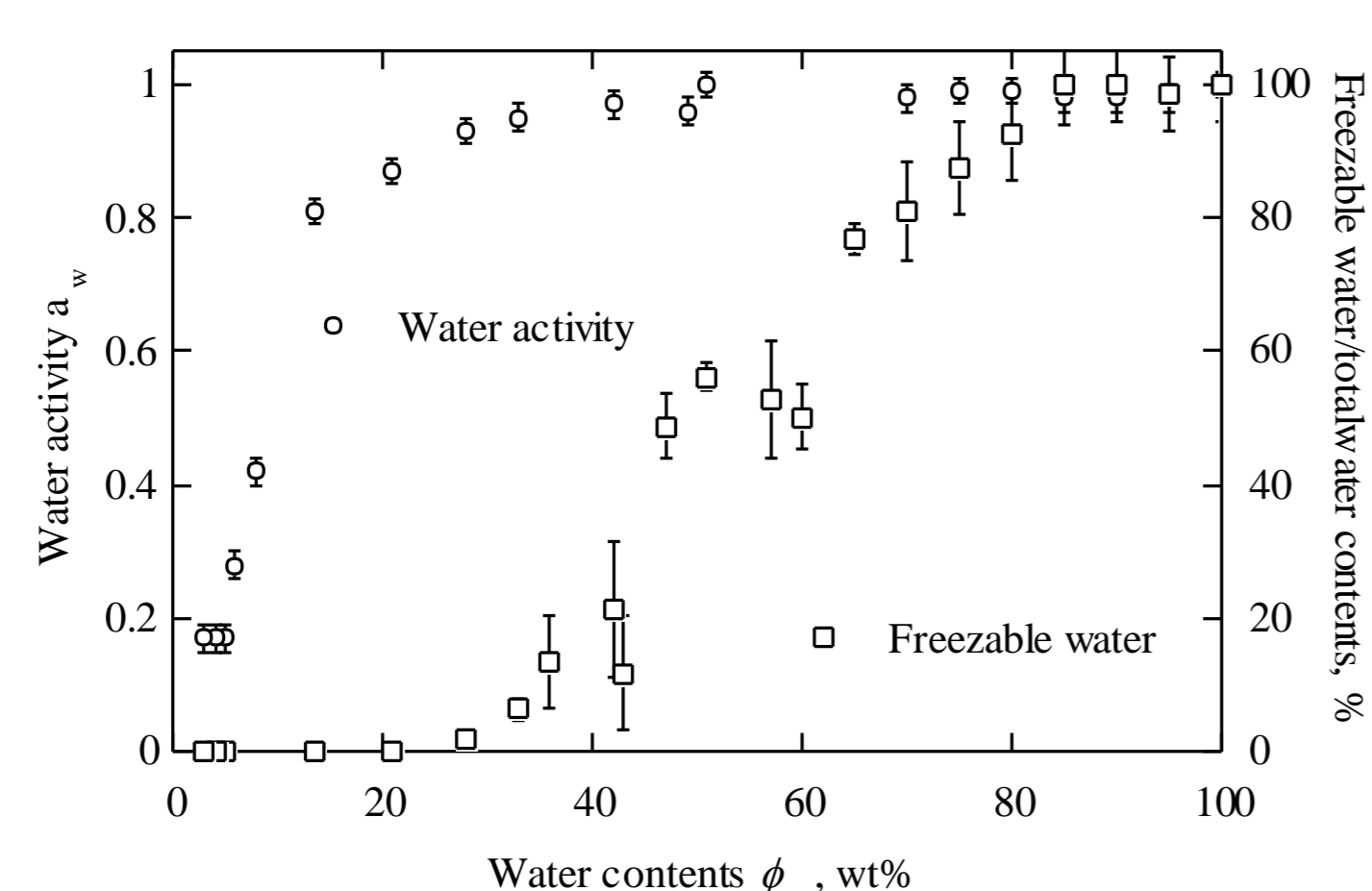


Fig.2 Water activity and freezable water in gelatin gel

Cellular Manipulation for Lyopreservation

Electrofusion of cell and GUV allows mass delivery of Lyo-/cryoprotectants into cells.

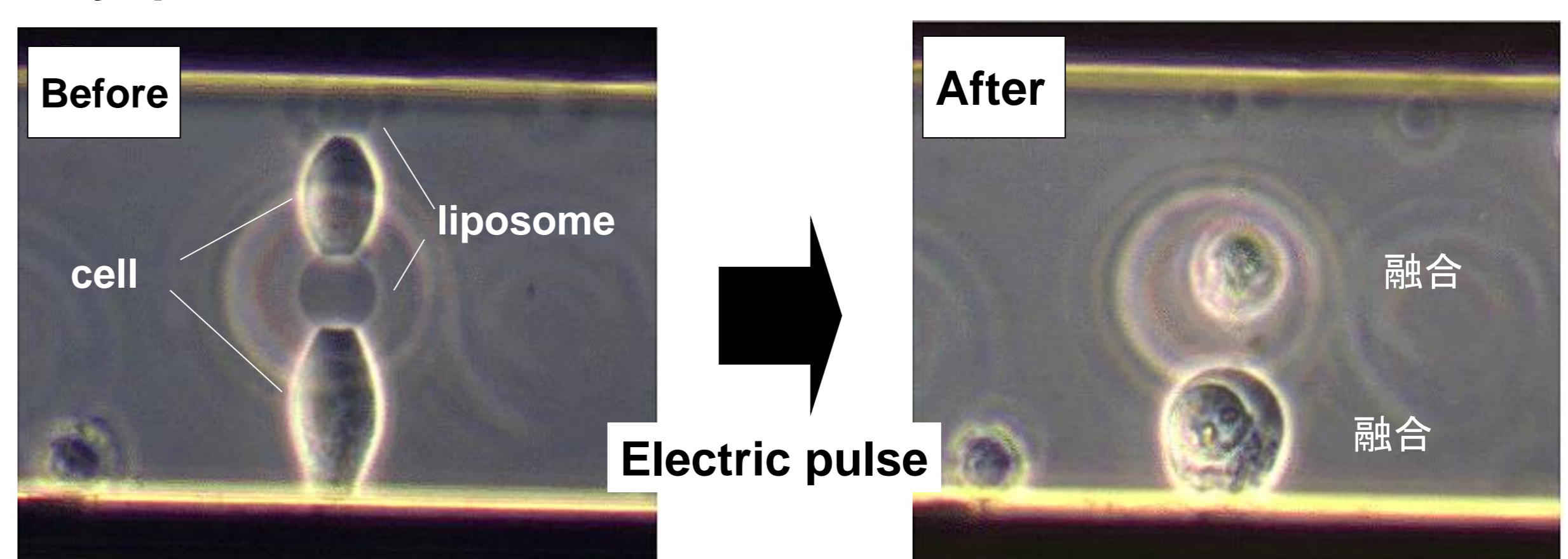


Fig.3 Electrofusion of Cell and Liposome including Lyo-/cryoprotectants

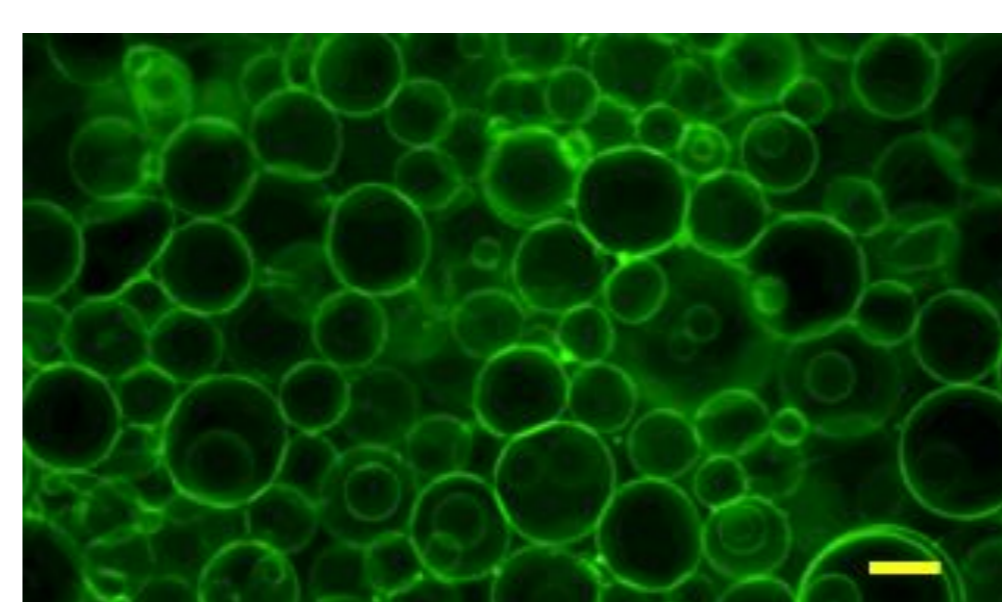


Fig.4 Rapid Production of Giant Unilamellar Vesicles

Visit Ee-103 for further information about electrofusion, and GUV production.

Visit Ee-103 for further results about Bound Water e.g. Dielectric spectra