

Shirakashi LAB.

[Dry-preservation of clinical analyte]

Department of Mechanical and Biofunctional Systems

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Mechanical
engineering
department

Phase Change Thermal Engineering

Degeneration and desiccation of biomolecules

Challenge for high quality bio-drypreservation

Biochemical exam of humoral clinical analytes, such as blood and lymphatic fluid exam, is getting important for detecting various diseases at their early stages. Nevertheless, most of biomarkers (proteins) contained in these analytes degenerate so rapidly that only around 100 out of 150,000 biomarkers discovered so far are clinically utilized. In addition to biomarkers for disease detection, genes (DNA, RNA) in high quality are also important because they provide individual gene information for tailor-made medicine. Thus, banking such deteriorative biomolecules in high quality with reasonable cost is fundamental key technology for providing high quality healthy life.

Our research target is developing and designing the rapid dry-process for preserving humoral analytes containing deteriorative biomolecules in high quality at room temperature. The research topics include;

- ◆ **Measurement of the phase change and mass transport properties of dry-protective agents.**
- ◆ **Vitrification (glass transition) by rapid dry process at room temperature**
- ◆ **Relaxation time distribution and quantification of bound (residual) water**
- ◆ **Prediction and evaluation of storage life of biomolecules**

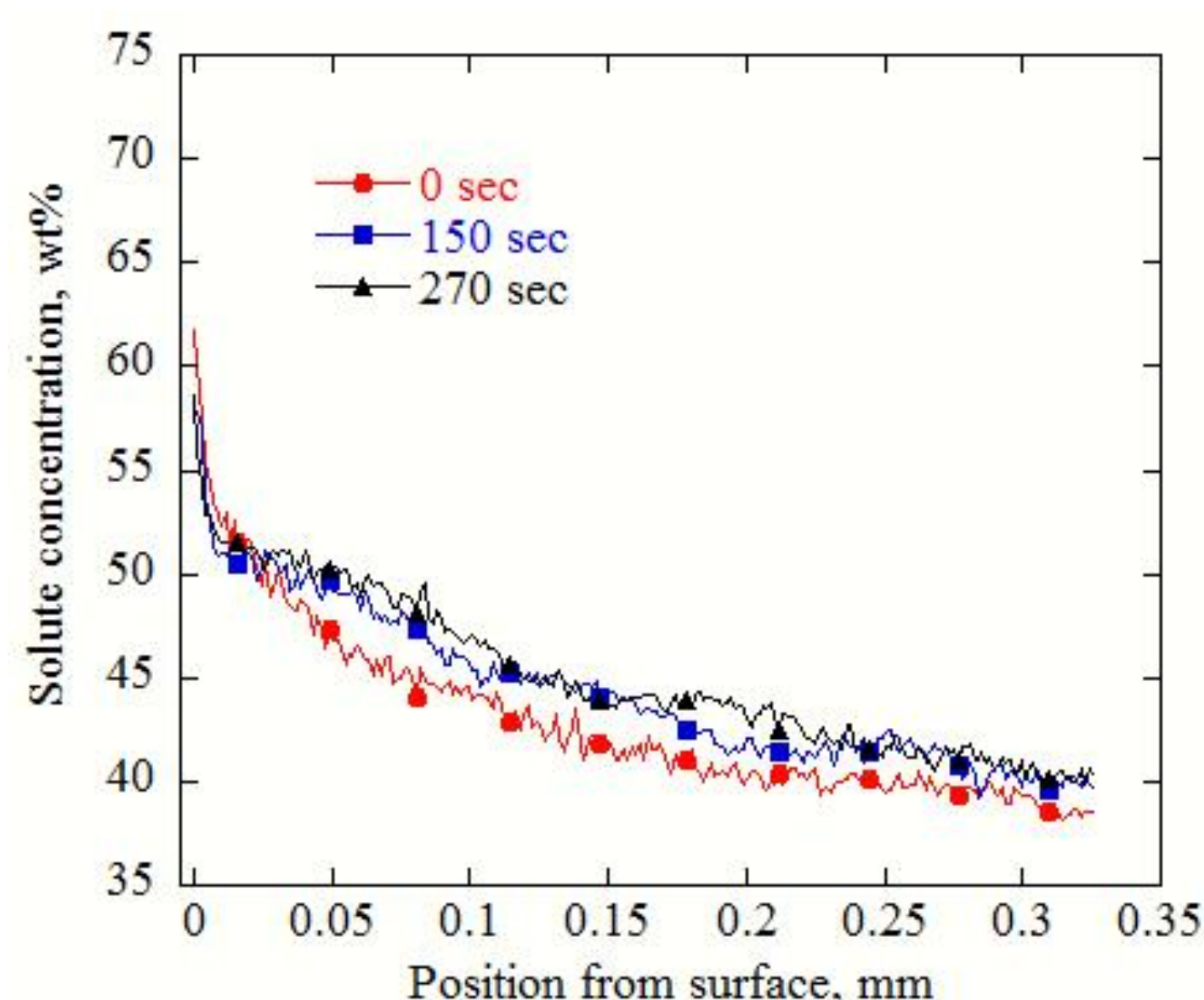


Fig.1 Concentration distribution of sample during drying process

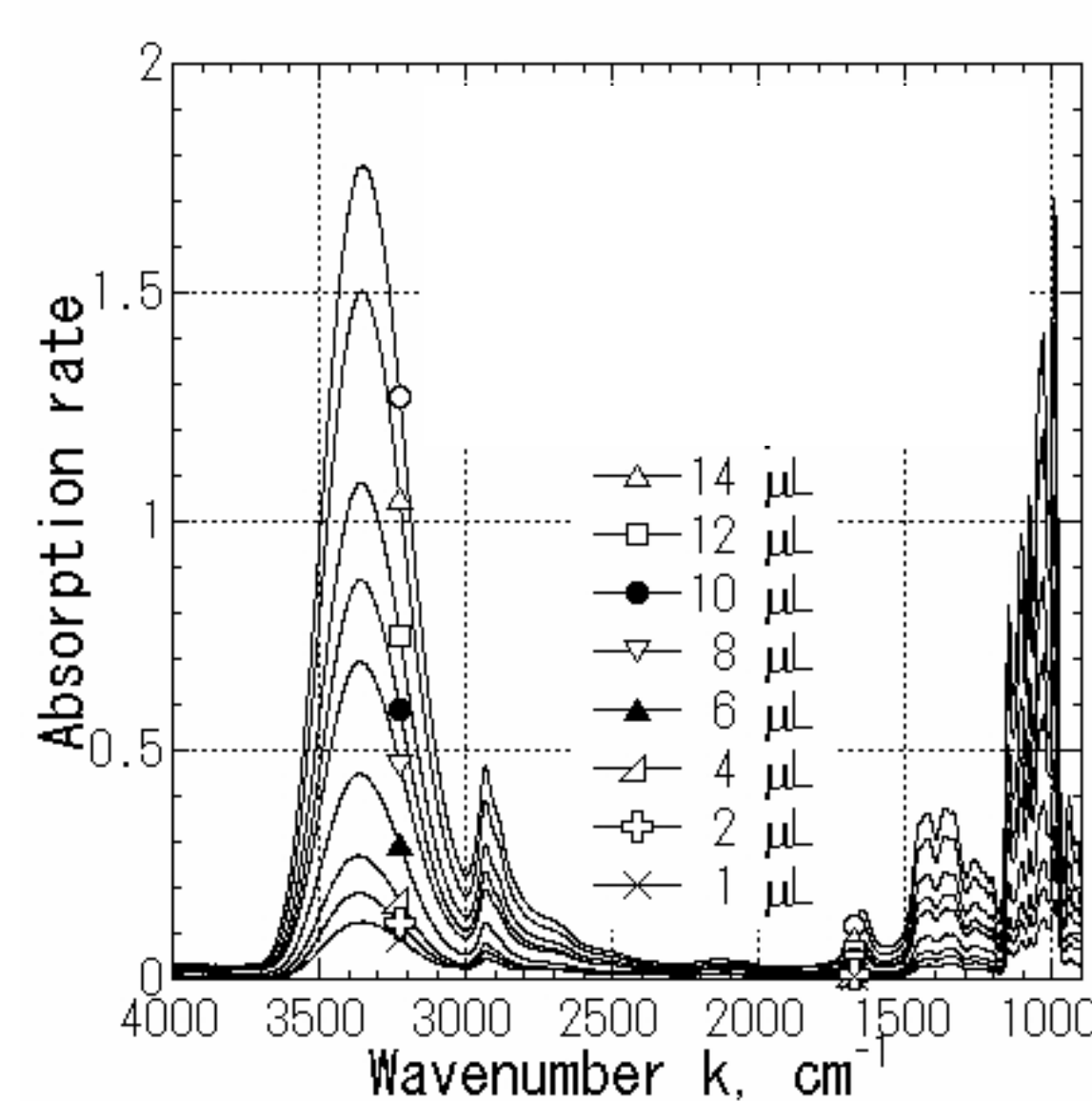


Fig.2 Infrared absorbance spectrum of vitrified dry protective sample

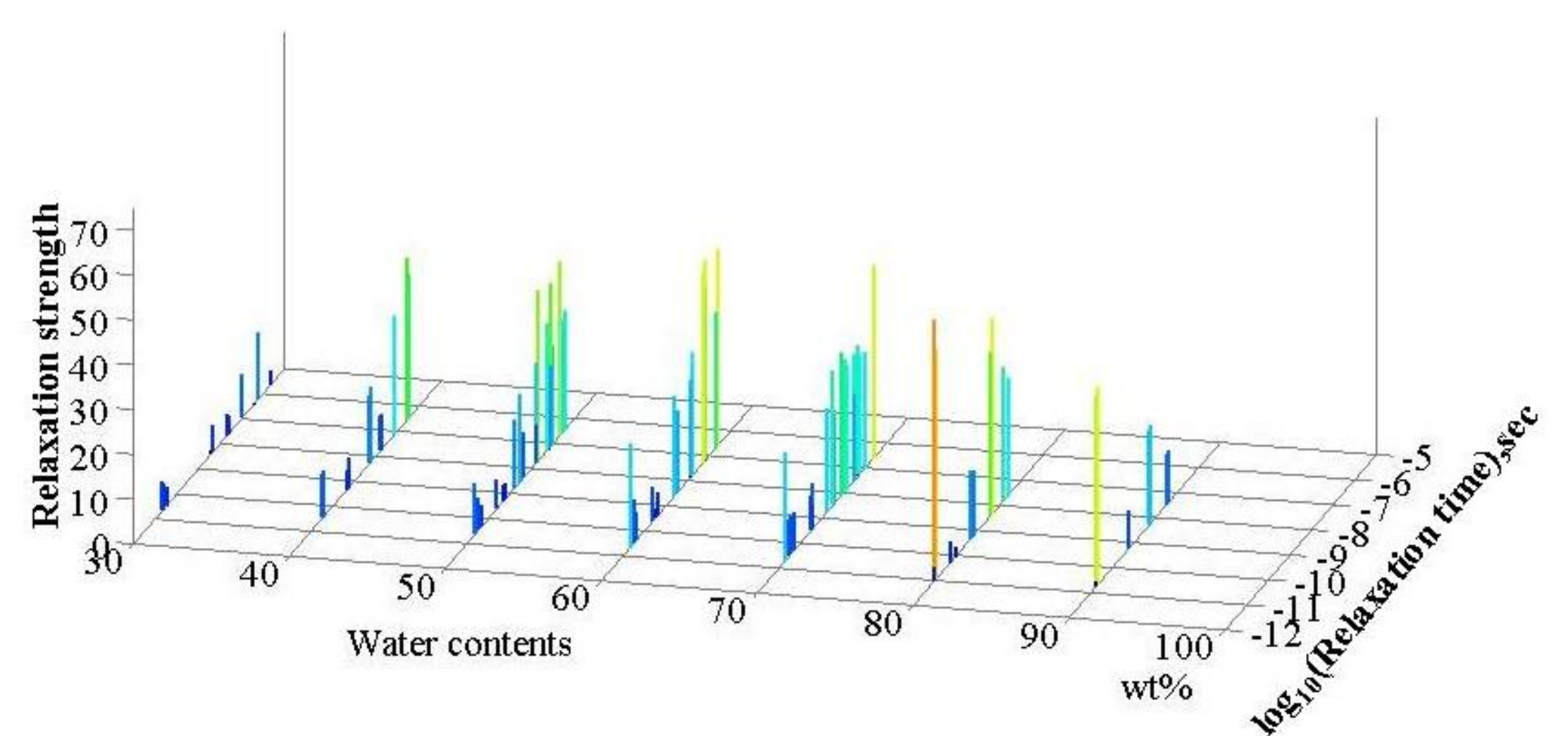


Fig.3 Relaxation time distribution of bound water in sample