

SHIRAKASHI LAB.

[Measurement and Controlling of Water in Biological system]

Department of Mechanical and Biofunctional Systems

<http://www.iis.u-tokyo.ac.jp/~aa21150>

Phase Change Thermal Engineering

Mechanical
engineering
department

Variety of Water under the Skin

Unveiling variety of water hidden in the skin

Human being is covered with skin which protects the body from its external environment to keep its internal environment. Water in the body, which composes 60~80wt% of the body, mediates all kinds of internal metabolic and biochemical reaction. Hence, keeping internal water is essential for surviving. Internal water is being lost through the skin at every moment, no matter the external environment is. The skin, which consists of stratum corneum, epidermal layer and dermal layer, has a function to retain and to control internal water losses. Dielectric spectroscopy unveils the various condition of water distributed in the skin (~1mm) that dynamically moving during drying process.

Dynamics of free water distributed in the skin

Distribution of bound water in the skin

Dielectric relaxation of living cell and its dynamics

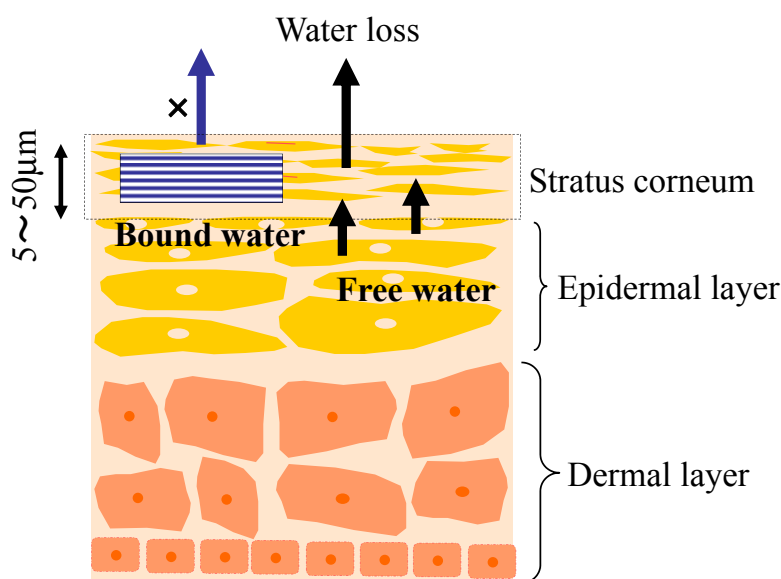


Fig.1. Schematics of skin histology and water loss

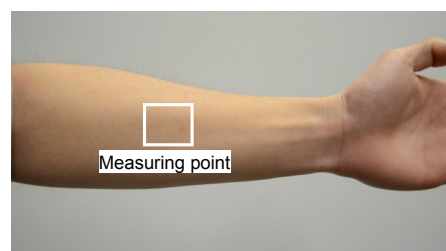


Fig.2. Measuring point (internal forearm)

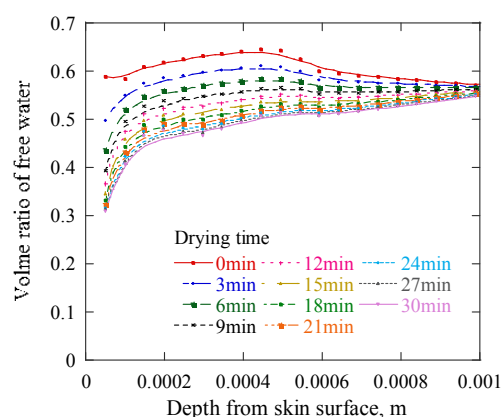


Fig.3. Free water distribution in the skin during drying