〈教育セミナー〉

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分子センシングによるヒト皮膚成分のイメージング

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Imaging of Human Skin Components by Molecular Sensing

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Abstract

The skin is an organ located in the outermost layer of the body, and it is important to be able to measure human skin *in vivo* (as it is, non-labeling) in dermatology, cosmetics science, and percutaneous absorption research. Within skin, the epidermis is of particular importance as it considered to correlate to skin condition. Specifically, smooth epidermal differentiation is thought to result in the generation of a healthy stratum corneum, which maintains the skin's protective barrier function. Many dermatological studies using immunostaining with fluorescent dyes or proteins have had limited success in revealing skin functions as these methods are known to affect the main components of the epidermis, including the water, lipids, and proteins. Spectroscopic techniques have high potential in the measurement of human skin components, as it can obtain the molecular vibrational signature of skin non-invasively *in vivo*/*ex vivo*. Near-infrared spectroscopy (NIR) can be used to visualize water, while spontaneous Raman can be used to analyze water, lipids, and free-amino acids in the skin. For application of Raman microscopy to the molecular imaging of human skin, non-linear Raman spectroscopy, such as coherent anti-Stokes Raman scattering (CARS) and stimulated Raman scattering (SRS), which enables faster measurement than with spontaneous Raman, is an attractive technique. In my talk, I gave examples of visualizing water in 2D using NIR imaging. I also introduced the latest results of intracellular morphologies in the human epidermis during the epidermal differentiation process using SRS, water distribution in the human stratum corneum using CARS and SRS, and the potential of coherent Raman microscopy in the label-free bio-imaging of skin to provide a cellular-level analysis of the skin's functions.

Key words:　CARS, NIR, Raman, spectroscopy, SRS.