

Thermal Diffusivity Effect in Opto-Thermal Skin Measurements

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Opto-thermal transient emission radiometry (or OTTER) is an infrared remote sensing technique that has been used in skin hydration, skin pigments, and trans-dermal drug delivery measurements, and all of the studies are focused on the optical properties of the skin, which is assumed thermally homogeneous. However, for samples such as in-vivo human skin, we know that it is not thermally homogeneous. Its thermal properties will change when the water content in the skin changes. Also, the thermal properties at the skin surface is different from that at deep inside.

In this paper, we will present our latest study on the thermal diffusivity effect in opto-thermal skin measurements. We will discuss how thermal diffusivity will affect the shape of the opto-thermal signal, and how to measure the thermal diffusivity in opto-thermal measurements of arbitrary sample surfaces. We will also present a mathematical model for a thermally gradient material, and its corresponding opto-thermal signal. Finally, we will show some of the latest experimental results of this thermal diffusivity effect study.