

New techniques use lasers, LEDs, and optics to 'see' under the skin

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Impressive examples of new non-invasive optical techniques using lasers, light-emitting diodes (LEDs), and spectroscopic methods to probe and render images from beneath the surface of the skin are featured in a newly completed special section in the *Journal of Biomedical Optics* published by SPIE, the international society for optics and photonics. The techniques may be used in a wide variety of medical and cosmetic applications such as treating burns, identifying cancer, or speeding the healing of wounds.

"The skin is the biggest organ of the body, and serves as its barrier to the environment," noted Special Section Guest Editor Jürgen Lademann of the Charité-Universitätsmedizin Berlin. "It provides protection against [water loss](#), keeps micro-organisms from invading the body, and responds sensitively to external stimuli. As a [sensory organ](#), the skin is an essential means of interpersonal communication."

Because they are easily accessible, the skin barrier and the underlying living cell layers are ideal subjects for investigation by optical and spectroscopic methods using light-based technologies that work from outside the body, Lademann said. Technologies such as fluorescence, reflectance, laser scanning microscopy, and Raman spectroscopy enable identification of tissues and fluids based on how their specific physical and chemical properties cause them to react to different wavelengths of light.

Optical imaging methods are becoming increasingly popular in the field

