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## ***In vivo* physiological imaging of biological tissues based on diffuse reflectance spectroscopy with an RGB camera**

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Quantitative assessment of optical properties is important for monitoring metabolism, viability and physiological conditions of *in vivo* biological tissues. Diffuse reflectance spectra of living tissues reflects the optical absorption spectra of biological chromophores (i.e., oxygenated hemoglobin, deoxygenated hemoglobin, bilirubin, cytochrome c oxidase, and melanin) and the light scattering spectra of tissues. Diffuse reflectance spectroscopy (DRS) has been widely used for the evaluation of chromophores in living tissue. The multispectral imaging technique is a useful tool for extending DRS to the spatial mapping of the chromophores and tissue morphology. This can be simply achieved by a monochromatic charge-coupled device (CCD) camera with narrowband filters and a white light source, which has been used to investigate the physiological conditions in living tissues such as blood perfusion, oxygenation state of hemoglobin, and melanin content. In clinical conditions, simpler, more cost-effective and more portable equipment is needed. The digital red, green, blue (RGB) imaging is a promising tool for satisfying these demands for practical application. Imaging with broadband filters, as in the case of digital RGB imaging, can also probe spectral information without mechanical rotation of a filter wheel. We have developed a simple imaging technique with a digital RGB camera for *in vivo* functional imaging of biological tissues. The experimental results indicated the ability to evaluate the physiological reactions and hemodynamics in rats and humans.

### **Biography**

Izumi Nishidate is working as an Associate Professor at the Graduate School of Bio-Applications and Systems Engineering, Tokyo University of Agriculture and Technology. His research spans the interdisciplinary fields of Biomedical Optics with particular emphasis on the development of new techniques for medical measurement, imaging and diagnosis. His major areas of activity include diffuse reflectance spectroscopy, spectral imaging, analysis of light transport in biological tissues and functional imaging of various organs. He received his PhD (2004) degree in Mechanical Systems Engineering, from Muroran Institute of Technology, Japan. He has authored/co-authored over 200 refereed journal articles, book chapters and conference/symposia proceeding articles.

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