

DIFFUSE REFLECTANCE SPECTROSCOPY WITH POLARIZATION GATING

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Spectrometry involves the analysis of chromophore content by observing the wavelength dependent attenuation of light which has propagated through a sample (Beer-Lambert law). Knowledge of the pathlength through which light has travelled is needed to treat this problem. In the presence of scattering, as in biological tissues, the optical pathlength depends non-trivially on the wavelength. As a result, the relationship between the measured attenuation, and the medium absorption, becomes non-linear. Polarization filtering to linearize this problem in the transmission geometry [1-2] allows simple models, such as the modified Beer-Lambert law to still be applied. We are interested in solving this problem in the backscattering geometry, using wide field illumination, and wide field detection (Fig.1).

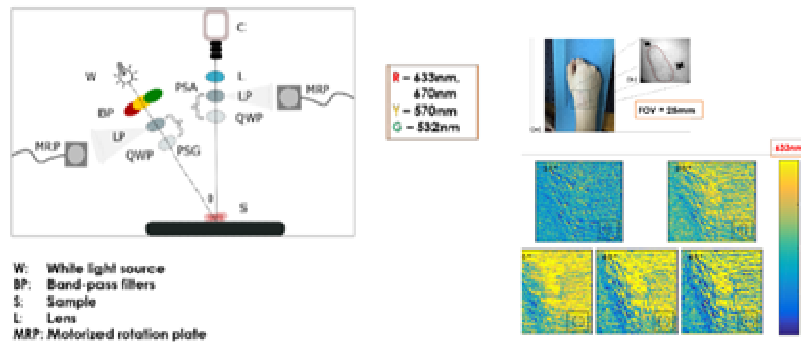


Fig. 1 : Left : Polarization gating Diffuse Reflectance setup ; Right : Examination of a burn scar, examples of measurements obtained with different ellipticities of polarization.

If a constant pathlength can be achieved through polarization modulation, then consistency of the probing volume will also likely improve, reducing errors incurred by mesoscopic inhomogeneities in the medium under investigation. In previous work, we have shown that modulation of the ellipticity of polarization, from linear to circular, allowed to sense the tissues at increasing depth [3-5]. Here, with the development of an optimized Monte Carlo simulation software [6-7], we investigate the use of polarization filtering with improved combinations of linear, elliptical, or circular, in order to improve this selectivity of the effective optical pathlength.

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