

Emerging Techniques in Modern Microscopies

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Calibration of multispectral and multimodal light emitting diode microscope for staining free malaria automate *parasitemia* determination

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We report the strategies we employed to adjust a modified commercial optical microscope to a multispectral and multimodal light emitting diode microscope for staining free malaria automated diagnosis and analysis. Automated counting and differentiation of healthy and parasitized red blood cells is achieved by the use of spectral fingerprint of the individual cell in transmission, reflection and scattering modes. The optimal contrast of the erythrocytes states images is reached by performing the angular dependence of both transmission and scattering measurements. The wavelength dependence and microscope objective achromaticity effects on the measurements and spectral images correlation are estimated. We also discuss how multivariate techniques like principal components analysis, k-mean and histogram analysis have been suitable for the image contrast function construction. The *Matlab* based automated counting and differentiation algorithm performance is presented and discussed.