Rapid estimation of optical properties from diffuse reflectance signals

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Diffuse reflectance (backscattering) imaging is of great interest due to the quick and non destructive measurement method. Optical properties of the biological material affect significantly the diffuse reflectance signal. Refractive index, absorption- and scattering coefficients (1/cm), anisotropy factor can be used to build models of backscattering. Especially absorption- and scattering coefficients are known to successfully describe maturity, moisture content, physical damage (bruising), soluble solids content (SSC) and similar important postharvest technology parameters. Inverse modeling was applied to estimate primary optical attributes of tissue and derived parameters such as penetration depth and diffusion coefficient. Inverse modeling was performed with the reference of Farrell-Patterson-Wilson diffusion theory model. Descriptive signal features of Full Width at Half Maximum (FWHM), slope of logarithmic profile, and advanced feature of width of intensity range rings around incident point were utilized.
Rapid calculation is required for practical applications instead of accurate but time consuming nonlinear curve fitting. Presented methods may offer new options to estimate optical properties of food and raw material.