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Fourier transform mid-infrared-attenuated total reflectance (FTMIR-ATR) microspectroscopy for determining textural property of microwave baked tuber

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Abstract

Time series spectroscopic and textural analysis data were obtained from 5 varieties of tuber samples during microwave baking. These data were analyzed using evolutionary computing methods including partial least square discriminant analysis (PLSDA), partial least square regression (PLSR) and locally weighted partial least squares regression (LWPLSR). PLSDA was able to discriminate the tuber samples into three separate classes corresponding to their spectral properties. The predictability of spectra in full wavenumber region (4000–600 cm^{-1}) and fingerprint region (1500–900 cm^{-1}) were calculated using PLSR and LWPLSR and the relative performances of developed models were compared. It was observed that similar or even better predictions were obtained by models using spectra in the fingerprint region. Then, first-derivative and mean centering iteration algorithm (FMCIA) was carried out to select potential effective wavelengths and these selected wavelengths were further simplified using successive projections algorithm (SPA) for improving the model efficiency. Based on the FMCIA-SPA method for wavelength selection, the optimized models were established using LWPLSR for determination of tuber textural property (TTP) in terms of hardness,

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