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Screening wavelengths with consistent and stable signals to realize calibration model transfer of near infrared spectra

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Abstract: Measurement environmental changes and spectral signal difference among multi-spectrometers may lead to big error in the process of transferring the model of near infrared (NIR) spectra to secondary instruments. Basing on the common sense that NIR calibration models built on the wavelengths at which the spectral signals of secondary instruments are stable and well consistent with the primary's could be shared directly by multi-instruments. Present work advanced a method named as screening wavelengths with consistent and stable signals (SWCSS) to transfer NIR calibration models. It eliminates the wavelengths at which the standard deviation of difference spectra between the primary and secondary instruments (SDDSI) is much higher than the standard deviation of precision detection spectra (SDPDS) of a sample tested on the primary and the wavelengths with higher SDPDS values. So that the spectral signals of different instruments at these selected wavelengths are consistent well and stable. The NIR calibration model is built by partial least square regression (PLS) based on the screened wavelengths. Two datasets of corn and radix scutellariae samples measured with different NIR instruments are used to test the performance of the method. The results show that the overall prediction performance of the SWCSS-PLS models for samples measured on secondaries is much better than that of the full-wavelength PLS models. The root mean square of error prediction (RMSEP) of the SWCSS-PLS models for samples tested on secondaries is equivalent or superior

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