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Quantitative Determination of Auramine O by Terahertz Spectroscopy with 2DCOS-PLSR Model

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Abstract

Residues of harmful dyes such as Auramine O (AO) in herb and food products threaten the health of people. So, fast and sensitive detection techniques of the residues are needed. As a powerful tool for substance detection, terahertz (THz) spectroscopy was used for the quantitative determination of AO by combining with an improved partial least-squares regression (PLSR) model in this paper. Absorbance of herbal samples with different concentrations were obtained by THz-TDS in the band between 0.2 THz and 1.6 THz. We applied two-dimensional correlation spectroscopy (2DCOS) to improve the PLSR model. This method highlighted the spectral differences of different concentrations, provided a clear criterion of the input interval selection, and improved the accuracy of detection result. The experimental result indicated that the combination of the THz spectroscopy and 2DCOS-PLSR is an excellent quantitative analysis method.

Keywords: Terahertz spectroscopy, Rapid measurement, Two-dimensional correlation terahertz spectroscopy (2DCOS-THz), 2DCOS-PLSR, Harmful dye

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