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Title:Method for improving terahertz band absorption spectrum measurement accuracy using noncontact sample thickness measurement

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Abstract:The terahertz absorption spectrum has a complex nonlinear relationship with sample thickness, which is normally measured mechanically with limited accuracy. As a result, the terahertz absorption spectrum is usually determined incorrectly. In this paper, an iterative algorithm is proposed to accurately determine sample thickness. This algorithm is independent of the initial value used and results in convergent calculations. Precision in sample thickness can be improved up to 0.1 μm . A more precise absorption spectrum can then be extracted. By comparing the proposed method with the traditional method based on mechanical thickness measurements, quantitative analysis experiments on a three-component amino acid mixture shows that the global error decreased from 0.0338 to 0.0301. © 2012 Optical Society of America.

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Main heading:Absorption spectroscopy

Controlled terms:Absorption spectra - Algorithms - Amino acids - Thickness gages - Thickness measurement

Uncontrolled terms:Acid mixtures - Global errors - Initial values - Iterative algorithm - Non-contact - Non-linear relationships - Sample thickness - Spectrum measurement - Terahertz absorption - Terahertz absorption spectrum - Terahertz band - Three-component

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