

论文

食用香料的太赫兹时域光谱

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摘要:

食用香料是人们在烹饪过程中必不可少的调味品,对食用香料的鉴别和食用安全性检测也尤为重要.本文利用太赫兹时域光谱技术对食用香料进行测试,得到了黑胡椒、白胡椒、花椒、大料、姜粉、甘草、香叶以及五香粉、十三香等香料在太赫兹波段的吸收谱和折射率谱.结果表明,不同种类的香料都有其独特的特征吸收光谱,样品的吸收谱在0.2~1.25 THz频段内以不同的斜率单调递增,在1.25~2.0 THz频段呈现出不同的吸收峰.样品的折射率在1.3~1.8之间变化,并且,样品的折射率在其吸收峰所对应的频率处出现了反常色散.通过对吸收系数的斜率、峰值位置以及折射率进行定标分析,太赫兹时域光谱技术可以用于不同种香料的定性检测.实验数据为食用香料的鉴别提供了依据,可以用于建立食用香料的太赫兹波谱数据库.

关键词: 太赫兹时域光谱技术 香料 光学常量

Spectroscopic Studies on the Edible Flavoring in Terahertz Range

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Abstract:

Edible flavor is one of the essential materials in cooking process and daily life, so the identification and testing of edible flavor become particularly important in food safety. In this paper, the optical property and spectroscopy of edible flavor were studied based on the terahertz time-domain spectroscopy (THz-TDS). By applying a numerical fast Fourier transform (FFT), the optical constants of black pepper, white pepper, Chinese prickly ash, aniseed, ginger, liquorice, bay leaf, five spices and thirteen spices were calculated. Different kinds of flavors have their unique characteristic absorption features. The absorption spectra of each kind sample increase in monotonic form and are not equal in the slope of curve in the range of 0.2~1.25 THz. However, in the range of 1.25~2.0 THz, edible flavoring shows different absorption features. The refractive indices of samples vary in the range of 1.3~1.8. The refractive indices of samples appear anomalous dispersion suggested that the resonance process is related with optical absorption, which also exhibit absorption peaks similar to those in the curve of absorption coefficient. THz-TDS technology can be used for qualitative analysis of different kinds of flavoring according to their characteristic spectral features. The results indicated that THz-TDS can be used to establish the fingerprint database of edible flavoring.

Keywords: Terahertz Time-Domain Spectroscopy (THz-TDS) Edible flavoring Optical property

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