

工程与应用

## LVQ聚类算法在爆炸物THz光谱识别中的应用

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**摘要** 运用THz光谱特性进行爆炸物的识别,是现代检测技术研究的一个热点。由于直接对原始数据进行聚类的识别率并不理想,首先对实验样本的THz频域光谱数据曲线进行二阶导数变换,得到了更能表现数据变化趋势和峰值的特征曲线,然后基于该特征曲线利用LVQ神经网络聚类算法,设计并用VC++6.0实现了THz光谱自动分类识别系统。分别对RDX、DNT、TNT、HMX四种爆炸物进行识别对比实验,运用原始数据训练出的分类器,识别率为96%,运用变换过后的特征数据训练出的LVQ分类器,识别率可以达到100%。实验证明,所设计的基于LVQ的神经网络分类器具有强大相似特征聚类功能和较高的识别率。

**关键词** [THz技术](#) [神经网络](#) [学习矢量化网络 \(LVQ\)](#) [聚类算法](#)

分类号

## Application of LVQ clustering algorithm to identification of explosive by THz spectroscopy

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### Abstract

The terahertz (THz) technologies is one research hotspot in the domain of detecting explosive. Because the result gotten by clustered with original frequency-domain pattern is not satisfactory. This paper introduces second derivative curve that transformed from frequency-domain THz spectrum. Based on LVQ clustering algorithm and the new characteristic curve, an automatic detection system is designed and finished by VC++6.0. Applying LVQ to identification of explosive by THz spectroscopy. Experiment to the four kinds of explosive: RDX, DNT, TNT and HMX, trained with original frequency-domain pattern, the correct rate is 96%. After computing effective feature from transformed data, input to the same network, the correct rate up to 100%. The result shows that the system based on LVQ can be very capable of similar character clustering and has higher rate of identification.

**Key words** [The terahertz \(THz\)](#) [neural network](#) [Learning Vector Quantization \(LVQ\)](#) [clustering algorithm](#)

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