



气体传感器温度调制信号的瞬时频谱分析

作者：安文, 魏广芬, 杨春英

单位：山东工商学院

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摘要：

温度调制技术已被证明为提高气体传感器选择性的有效方法之一。为了有效提取传感器对被测气体的响应特征，提出应用Hilbert-Huang变换对温度调制下的气体传感器的动态信号进行分析，可获得传感器动态响应信号中的瞬时频谱和边际谱等有效的气体响应特征。通过对一个微热板式气体传感器在矩形波调制下对三种易燃易爆气体响应的动态信号进行测试和分析，说明提取的瞬时频谱和边际谱能较好的体现被测气体信息。进一步研究了调制周期对动态响应信号的影响和该方法在正弦波、三角波等温度调制模式下的传感器对三种易燃易爆气体的响应，结果说明使用瞬时频谱能够有效提取信号中的气体信息。

关键词：气体传感器，温度调制，Hilbert-Huang变换，瞬时频谱

Instantaneous Spectrum Analysis of Temperature Modulated Gas Sensor Signals

Author's Name:

Institution:

Abstract:

Temperature modulation has been proved an efficient technique for improving the gas sensors' selectivity. In order to extract the response features of detected gas effectively, the Hilbert-Huang transform is proposed to process the dynamic signal of temperature modulated gas sensors. The obtained instantaneous spectrum and marginal spectrum can be used as effective gas sensing features. The proposed method is applied to process the test signals of a microhotplate gas sensor response to three flammable and explosive gases. Results demonstrate that the instantaneous frequency spectrum and marginal spectrum shown the detected gas information excellently. Influences of modulation periods on dynamic signals are further studied as well as the application of the approach to sine wave and triangular wave modulated sensor signals. It is shown that the instantaneous frequency spectrum is effective to draw the gas information from dynamic signals.

Keywords: gas sensor; temperature modulation; Hilbert-Huang transform; instantaneous frequency spectrum

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