

## 金属氧化物气体传感器检测混合气体组分浓度的线性方法与原理

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摘要:

金属氧化物气体传感器的交叉敏感特性给混合气体各组分浓度的定量检测带来了困难。基于传感器的灵敏度与被测气体浓度呈对数线性关系, 同一传感器对不同被测气体具有不同的灵敏度, 不同传感器对同一气体具有不同的敏感特性, 描述了采用多个传感器检测混合气体各组分浓度的线性原理与方法, 并介绍了识别未知多组分混合气体中某一组分浓度的方法。分析结果表明, 在传感器有效测试浓度范围内, 有 $n$ 种组分的混合气体各组分浓度的对数等于 $n \times n$ 的指数矩阵乘以 $n \times 1$ 的指前系数与传感器的输出的函数的对数矩阵。实验结果显示, 对混合气体各组分浓度检测的相对误差小于7%。

关键词: 混合气体检测; 金属氧化物; 敏感特性; 多传感器; 指数矩阵

## Principles and Means of Composing Concentration Detection of Mixture Gases With Metal Oxide Gas Sensors

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**Abstract:**

It's difficult to detect composing concentration of gases mixture with metal oxide gas sensor because of cross responses of various gases. Base on the typical sensitivity characteristic, i.e. sensitivity depend on gas concentration submitting logarithmic linear property, same type of metal oxide gas sensor has different sensitivity characteristic for different gases, and different type of metal oxide gas sensor has different sensitivity characteristic for same gas. The principles and means of linear formula for detection of composing concentration of mixture gases using various metal oxide gas sensors has been presented, and introduced measurement of single gas concentration of unknown mixture gases. Result show logarithm of composing concentration of mixture gases is equal multiply  $n \times n$  exponent matrix by  $n \times 1$  function matrix of output of sensors array and coefficient in the concentration range of sensor effective measurement. Experiment show the detect error of composing concentration of mixture gases less than 7%.

**Keywords:** Mixture gases detection; Metal oxide; Sensitivity characteristic; Multi-sensor array; Exponent matrix.

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