

基于碳纳米管微传感器阵列和随机共振的气体检测方法研究

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摘要:

本文提出了一种基于多壁碳纳米管微传感器阵列和非线性随机共振算法的新型气体检测方法。微传感器阵列包括碳纳米管阳极传感器和碳纳米管阴极传感器以减小检测系统的交叉灵敏度。实验检测了乙醇、丙酮和氨气三种气体, 传感器阵列响应输入随机共振系统进行处理, 结果表明, 信噪比曲线参数能够标定气体浓度和种类, 且随机共振处理方法可以有效的降低系统的交叉灵敏度, 检测系统具有较好的灵敏度和重复性, 具有较好的实用价值。

关键词: 气体传感器, 微传感器, 碳纳米管, 随机共振, 信噪比

Study of a novel gas detecting system based on carbon nanotubes miniaturization sensor array and stochastic resonance

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Abstract:

In this paper, a gas detecting system based on carbon nanotubes (CNTs) miniaturization sensor array and non-linear stochastic resonance algorithm was proposed. The sensor array included CNTs anodic sensor and cathodal sensor to reduce the cross-sensitivity. Ethanol, acetone and ammonia detecting experiments were carried out. The sensor array responses were recorded, and the bistable stochastic resonance was utilized to calculate the signal-to-noise ratio (SNR). The gas concentrations and varieties could be determined by SNR parameters, and stochastic resonance method could reduce cross-sensitivity of the detecting system. The detecting system presented good sensitivity, repeatability, and practical value.

Keywords: gas sensor, miniaturization sensor, carbon nanotubes, stochastic resonance, signal-to-noise ratio

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