

## 覆盖聚合物敏感膜的水平剪切型声表面波气体传感器机理分析

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摘要:

本文采用微扰理论分析了覆盖聚合物敏感膜的水平剪切型声表面波气体传感器 (SH-SAW) 的响应机理。以针对有机氟聚醚 (FPOL) 膜材料为例, 分析了聚合物膜厚以及传感器工作频率在敏感膜吸附气体时对传感器响应的影响。计算结果表明, 二甲基磷酸二甲酯 (DMMP) 气体响应随 FPOL 膜厚和传感器工作频率的改变呈现非线性变化。为了获得线性特性的传感器, 在气体浓度检测范围内, 通过理论计算提取出了优化的 FPOL 敏感膜膜厚和传感器工作频率等参数。

关键词: 气体传感器; 响应机理; 水平剪切型声表面波; 聚合物敏感膜

## Theoretical analysis on response mechanism of polymer-coated shear horizontal surface acoustic wave gas sensor

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**Abstract:**

In this paper, the response mechanism of polymer-coated shear horizontal surface acoustic wave (SH-SAW) sensor was analyzed. Taking fluoropolymer (FPOL) as the sensitive detector for organophosphorus agents, the sensor response of the gas adsorption was analyzed. Calculation results indicate that the SH-SAW gas sensor has non-linear response with different FPOL thickness and operating frequency. To obtain a monotone gas response, the optimal parameters including the FPOL thickness and the operating frequency were determined theoretically.

**Keywords:** gas sensor; response mechanism; shear horizontal surface acoustic wave; polymer sensitive film

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