

## 基于ANSYS的声表面波氢气传感器压电分析

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摘要：

本文设计了声表面波氢气传感器的结构，利用ANSYS软件建立了声表面波传感器的有限元模型，并对SAW氢气传感器进行了仿真，最后用数据处理软件Origin分析了敏感薄膜的材料参数对传感器输出的影响。传感器通入1000ppm的氢气后，钯膜的厚度、密度、弹性模量等发生了相应改变，进而导致输出电压、频率等发生变化。分析表明：钯膜的厚度增大时，声表面波在压电基底上的传播速度减慢，频率变小，输出端电压的幅值增大；钯膜的密度变小时，输出端电压的幅值变小，膜的弹性模量变小时，输出端电压的幅值增大，时间上略有延迟。

关键词：声表面波； 氢气传感器； ANSYS； 压电分析

## The piezoelectric analysis of SAW hydrogen sensor

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**Abstract:**

The structure of the surface acoustic wave (SAW) sensor was designed. The finite element model of SAW hydrogen sensor was developed and simulated using ANSYS platform. As the sensor was exposed to 1000ppm hydrogen, the thickness, the density and the elastic modulus of the Pd film have changed correspondingly, which lead the change of output voltage and frequency. When the thickness of Pd film increased, transmission of SAW in the piezoelectric substrate slowed down, the frequency became smaller and the amplitude of the output voltage increased; when the density decreased, the amplitude of the output voltage became smaller; when the elastic decreased, the amplitude of output voltage increased and have a slight delay.

**Keywords:** Surface acoustic wave(SAW); Hydrogen sensor; ANSYS; Piezoelectric analysis

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