

## 基于Pd-Ni/Si Nanowires电极室内甲醛实时监测处理装置

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摘要：

本文研究设计一种室内甲醛气体实时监测和处理一体化装置。首先，通过电化学方法刻蚀大面积硅纳米线阵列并通过钯-镍/硅纳米线 (Pd-Ni/SiNWs) 阵列电极，Pd-Ni/SiNWs阵列电极对甲醛有很强电化学催化氧化作用，以其为电化学电极，Ag/AgCl为参考电极，循环伏安技术测试结果显示该传感器对甲醛浓度灵敏度高达 $0.265 \text{ mA mmol L}^{-1}$ ，三倍信噪比AD单片机产生三角波扫描电压模拟循环伏安原理，可利用回路中因催化氧化产生的峰电流值来监测室内甲醛浓度，方案新颖、成本低廉、便于携带，具有较大实际应用价值。

关键词：电化学甲醛传感器；钯-镍/硅纳米线电极；循环伏安；峰电流

## A Real-Time Monitoring and Processing System for Detecting Indoor Formaldehyde Based

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**Abstract:**

In this paper, a novel indoor formaldehyde sensor was designed. Firstly, a silicon nanowire with high surface to volume was and modified with nickel (Ni/SiNWs) and palladium (Pd-Ni/SiNWs) by electroless plating. The Pd-Ni/SiNWs electrode was used as a working electrode. Ni/SiNWs electrode was adopted as a counter electrode, and Ag/AgCl served as a reference electrode. The sensitivity of  $0.265 \text{ mA mM}^{-1}$  and the corresponding detection limit of  $2 \mu\text{mol L}^{-1}$  at a signal to noise ratio of 3. Furthermore, a microcontroller unit (MCU) was employed to generate a triangular-wave voltage which could drive the electrochemistry formaldehyde sensor working. The peak current value was used to detect the concentration of formaldehyde. The device is simple, inexpensive, easily integratable, highly sensitive, and portable.

**Keywords:** Electrochemical formaldehyde sensor; Pd-Ni/SiNWs electrode; Cyclic Voltammetry; Peak Current Holder