

聚苯胺/TiO₂修饰的QCM气敏传感器及湿度影响研究

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摘要:

用气敏传感器检测三甲胺在食品检验和环境监测等领域具有广泛意义, 而湿度影响在这些实际应用中通常无法避免, 如何补偿和校正湿度干扰是传感器设计和使用中的重要课题。本文考察了一种以聚苯胺/TiO₂复合材料为敏感膜的QCM气敏传感器在干燥和不同湿度气氛中对三甲胺气体的响应特性, 结果表明均呈现出良好的线性敏感性。发现了在湿度干扰下的传感器漂移规律, 并通过多元线性回归方法建立了一定浓度和湿度下的响应数学模型, 计算表明用该模型可较大地提高湿度干扰下浓度估算的准确度。

关键词: 气敏传感器; QCM; 导电聚合物; 传感器漂移; 湿度影响

A PANI/TiO₂-based QCM Gas Sensor with Humidity Influence Study

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Abstract:

Trimethylamine detection using gas sensors is very meaningful in the area of food inspection and environment monitoring, etc. In those application occasions, however, how to compensate or calibrate the usually-inevitable humidity influence became an important issue in both sensor design and application phase. In this paper, the response behavior of a QCM gas sensor based on polyaniline/TiO₂ composite to trimethylamine at different humidity atmosphere was studied. The results showed very linear sensitivity in all those conditions, and also indicated a pattern of sensor drift due to humidity. A mathematical response model with different concentration and humidity was built using multiple nonlinear regression method, and was used for calibrating humidity influence, resulting in a significant increasing of accuracy for concentration predicting.

Keywords: gas sensor; QCM; conducting polymer; sensor drift; humidity influence

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