

氨气检测的聚苯胺碳纳米管复合敏感膜的研究与应用

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摘要:

本文介绍了基于聚苯胺及多壁碳纳米管复合材料的氨气传感器的制备与测试, 使用原位聚合法使苯胺单体以碳纳米管为核心进行聚合反应, 运用介电泳法制备得聚苯胺/多壁碳纳米管气敏复合膜传感器。该传感器对10ppm氨气的响应灵敏度为3.4, 响应时间15s, 大幅优于传统的聚苯胺薄膜型氨气传感器。实验结果表明, 由于碳纳米管在介电泳过程中构建的大比表面积纳米三维结构和优良的导电率, 纳米复合材料的微观结构和导电性能都得到大幅改善, 从而使得复合物具有相对于纯聚苯胺膜更好的气敏特性。

关键词: 聚苯胺, 碳纳米管, 原位聚合, 气体传感

The research and application of polyaniline/multi-walled carbon nanotubes composite sensitive membrane for ammonia gas detection

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Abstract:

Carbon nanotube and Polyaniline (Pani) composite for gas sensing were investigated in this paper. Pani coated multi-walled carbon nanotube (MWNT) was synthesized by means of in-situ polymerization and dielectrophoresis. The nano-composite sensor showed a 340% reversible resistance change to 10ppm NH₃ with a response time of 15s while the sensitivities of Pani film sensor is 190% in the contrast experiment. The results indicate that the nano-composite sensitivity and sensing dynamic are improved due to the nanostructure with ultra-high surface-volume ratio and good conductivity. The mechanism of sensitivity to NH₃ of the sensor was also discussed.

Keywords: polyaniline, carbon nanotubes, in-situ polymerization, gas sensing

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