

Zn²⁺掺杂WO₃基气敏材料的制备及气敏性能研究

作者: 桂阳海* 徐甲强 李超 孙雨安

单位: 郑州轻工业学院 河南省表界面科学重点实验室

基金项目:

摘要:

通过加热分解钨酸制备的WO₃与Zn(NO₃)₂溶液超声分散, 制备出了掺杂Zn²⁺的WO₃基气敏材料。研究了Zn²⁺掺杂对WO₃气敏材料性能的影响。结果发现, Zn²⁺掺杂WO₃基传感器对H₂S有较好的气敏性能, 在常温下对极低浓度(5ppm)H₂S也有很高的灵敏度(56), 适量掺杂可以提高其灵敏度, Zn²⁺掺杂2at%的WO₃基传感器的灵敏度最大, 对50ppmH₂S在200℃灵敏度可达1800。通过X-射线衍射仪(XRD), 比表面测定仪(BET)对材料进行了表征, 比表面积范围介于2.5-3.5m²/g之间。结合有关理论, 对元件气敏现象及机理进行了解释。

关键词: WO₃基气敏材料, 掺杂, 气敏传感器, H₂S, 室温

Preparation and gas sensing properties of WO₃-based gas sensors by doping Zn²⁺

Author's Name: Gui Yanghai, Xu Jiaqiang, Li Chao, Sun Yu'an

Institution: (Henan Provincial Key Laboratory of Surface & Interface Science, Zhengzhou University of Light Industry)

Abstract:

The WO₃ powder was obtained by means of thermal pyrolysis of tungstic acid, then an appropriate amount of powder was impregnated into the solution of Zn(NO₃)₂ with ultrasonic treatment to prepare the WO₃ composite of various ratio of Zn²⁺ (0at%, 1at%, 2at%, 5at%, 7at%, 10at%). The gas sensing performances to ethanol, acetone, xylene, formaldehyde and H₂S were studied for the as-synthesized samples. Particularly, the gas-sensing performance to H₂S was investigated in detail at different temperatures and concentrations. The results show that the Zn²⁺ doped WO₃-based gas sensors have high sensitivity even to a very low concentration (5ppm) of H₂S at room temperature and appropriate amount of Zn²⁺ doping can significantly improve its gas sensing properties. The WO₃-based gas sensor by doping 2at% Zn²⁺ shows a maximum sensitivity of 1800 towards 50 ppm H₂S at 200°C. The samples were characterized by X-ray diffraction(XRD) and BET method. The specific surface areas of the samples were all in the range of 2.5-3.2 m²/g. At last, the phenomena and gas-sensing mechanism of these sensors were also discussed.

Keywords: WO₃-based gas-sensing material, doping, gas sensors, H₂S, room temperature

投稿时间: 2010-04-27

[查看pdf文件](#)