

论文

溶胶凝胶法制备Pt/WO₃氢气敏感材料的研究

杨志¹, 杨明红¹, 代吉祥¹, 曹坤², 廖汉生², 张鹏程²

1. 武汉理工大学 光纤传感技术国家工程实验室, 武汉 430070;
2. 中国工程物理研究院, 四川 绵阳 621907

摘要:

采用溶胶凝胶法制备纳米级WO₃,掺杂不同含量的氯铂酸并混合搅拌均匀,再进行热处理,将所得粉体均匀涂覆在光纤光栅周围,制备出具有氢敏特性的光纤光栅传感器.实验中,通过改变氯铂酸掺杂量和热处理温度并进行XRD物相分析得:随着Pt:W的降低以及热处理温度的升高,WO₃的结晶度不断提高;通入不同浓度的氢气对传感器进行氢敏性能测试发现,经过300℃热处理,Pt:W为1:9时,对4%浓度的氢气能达到15 s的响应速度,最高有140 pm的中心波长变化,多次重复通氢气,重复性良好;当热处理温度达到500℃时,材料对氢气已经不敏感.

关键词: 离子交换 Pt/WO₃ 晶体结构 光纤光栅 氢敏

Characteristics of Pt/WO₃ Hydrogen Sensitive Material Prepared by Sol-gel Method

YANG Zhi¹, YANG Ming-hong¹, DAI Ji-xiang¹, CAO Kun², LIAO Han-sheng², ZHANG Peng-cheng²

1. Centre for Optical Sensing, Wuhan University of Technology, Wuhan 430070, China;
2. China Academy Engineering Physics, Mianyang, Sichuan 621907, China

Abstract:

Nanostructured WO₃ mixed with chloroplatinic acid was prepared by sol-gel method. Fiber Bragg grating was coated with the hybrid material. The as-prepared powder was mixed with different ratio of chloroplatinic acid and annealed at different temperatures and their structures were characterized by X-ray diffraction. The results show that the crystallinity of WO₃ increases with the decrease of chloroplatinic acid and the increase of thermal treating temperature. The experiment demonstrates that after being annealed under 30℃ with the Pt:W ratio of 1:9, the sensor has good repeatability, can reach the response speed of 15 s to 4% Hz, and has 140 pm central wavelength change. The sensor shows no sensibility with further increase of temperature up to 500℃.

Keywords: Ion exchange Pt/WO₃ Crystal structure FBG Hydrogen sensitivity

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通讯作者: 杨明红(1975-),男,教授,主要研究方向为薄膜光电子器件及光纤传感器.Email: minghong.yang@whut.edu.cn

作者简介:

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