

论文

退火温度对TiO₂纳米薄膜酒精气敏特性影响的研究

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摘要:

采用直流磁控溅射的方法在Al₂O₃陶瓷管、硅基片上溅射制备了二氧化钛(TiO₂)纳米薄膜材料.将薄膜样品放入管式退火炉中分别在500℃, 700℃和1 100℃温度下退火.由于退火温度的不同,薄膜的晶体结构、晶粒尺寸、晶向以及气敏特性都有所不同.利用X射线衍射(XRD)技术和薄膜气敏特性测试,分析了退火温度对薄膜气敏特性的影响.分析结果表明退火温度在500℃时,呈现锐钛矿结构,薄膜具有很好的选择性、很短的反应(恢复)时间.对TiO₂薄膜表面进行修饰,发现此TiO₂薄膜的最佳工作温度为370℃左右.薄膜的气敏机理也得到了讨论.

关键词: 二氧化钛纳米薄膜 退火温度 乙醇气敏特性

Sensing Troperties Towards Ethanol Vapor*

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Abstract:

Nanosized TiO₂ thin films were prepared by the method of DC magnetron sputtering,and the films were deposited on alumina tubes and silicon substrates. After the deposition, the films were annealed at 500℃, 700℃ and 1 100℃ in a muffle respectively. The film properties such as crystal structure, grain size, phase and gas sensitivity varied on account of the annealing condition. X-ray diffraction (XRD) and gas sensing measurements were carried out to find out the relation between sensitivity and annealing temperature. Anatase occurs at annealing temperature 500℃. Sensitivity is the highest with wonderful selectivity and shortest response(recover) time for the anatase phase. After modified the surface of TiO₂ thin film,it could be concluded that the best operating temperature for the devices is 370℃. The mechanism of the gas sensing properties was also discussed.

Keywords: TiO₂ thin films Annealing temperature Ethanol-sensing properties

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