

室温全固态电位型氢传感器研究 室温全固态电位型氢传感器研究

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摘要:

以磷酸(PWA)为基质, 加入适量的P2O5, 制备(H3PW12O40-H2O-H3PO4(PWAP)电解质, 并研究了相对湿度对电解质电导率的影响。结果表明: PWAP电解质, 室温电导率达到0.045 S/cm; 相对湿度在20%~80%范围内, 电解质的电导率变化不大; 在40℃下长时间放置, 电解质的质量损失小于2%, 表明其常温保水性好。将电解质应用于氢气传感器中, 利用混合压膜的方法制作传感催化电极和对电极, 研制了室温全固态电解质氢气传感器。传感器的组成为: 空气, Pt/C|PWAP|Pt/C, H2(在N2中), 考察了传感器的电位响应值与氢气体积分数之间的关系, 以及相对湿度对氢气传感性能的影响。

关键词: 氢气传感器; 电化学; 磷酸电解质; 混合压膜

Studies on hydrogen catalytic sensor based on H3PW12O40-H2O- H3PO4 composite electrolyte

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Abstract:

A novel electrolyte of phosphotungstic acid (PWA) doped with P2O5 was prepared. The effect of relative humidity on the conductivity of the electrolyte was investigated by the impedance at room temperature. The results indicated that the conductivity of H3PW12O40-H2O- H3PO4 (PWAP) electrolyte was 0.045 S/cm at room temperature. The conductivity of the electrolyte changes slightly at a relative humidity range of 20%-80%. The weightlessness of PWAP electrolyte heated to 40°C was less than 2%, which indicated that retained water ability was good. The electrode was prepared from Pt/C powder mixed with Teflon by the mixture-pressing method for H2 electrochemical sensor prepared with the PWAP electrolyte. The sensor element is composed of the following electrochemical cell: (reference electrode) air, Pt/C | PWAP|Pt/C, H2(in N2) (sensing electrode). The effects of the relative humidity on the sensing potential are presented.

Keywords: hydrogen sensor; electrochemistry; phosphotungstic acid; mixture-pressing method

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