

研究论文

SO₂ 气体对质子交换膜燃料电池阴极性能的影响

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摘要 将 $5 \times 10^{-8} \sim 3.2 \times 10^{-6}$ (空气中的体积含量)的SO₂通入质子交换膜燃料电池(PEMFC)单电池阴极, 研究了SO₂对PEMFC性能的影响. 实验得到的电压-时间(V-t)曲线和极化(V-I)曲线表明, 空气中SO₂含量达到 5×10^{-7} 时, 将对PEMFC的性能产生显著的和不可逆的影响, 且SO₂浓度越大电池性能的下降幅度越大. 对SO₂影响前后的电化学交流阻抗谱(EIS)的解析表明, 电池电荷传递阻抗(R_{ct})的变化可逆, 而阴极的表面状态发生了不完全可逆的变化. 循环伏安(CV)实验数据进一步证明, SO₂毒化后阴极的活性电化学表面积(EAS)缩小.

关键词 [质子交换膜燃料电池](#) [阴极](#) [二氧化硫](#)

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Effects of SO₂ on Cathode Performance of Proton Exchange Membrane Fuel Cell

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Abstract SO₂ with volume fractions from 5×10^{-8} to 3.2×10^{-6} was introduced into the cathode of a single Proton Exchange Membrane Fuel Cell (PEMFC) to investigate the effect of SO₂ on the performance of the PEMFC. Voltage-time (V-t) curve and polarization (V-I) curves show that 5×10^{-7} SO₂ can cause significant and irreversible effect on the cell performance, and the performance decay increases with SO₂ volume fraction increasing. Using electrochemical impedance spectroscopy (EIS), it was found that after being poisoned by 5×10^{-7} SO₂ for 130 h, the charge transfer resistance (R_{ct}) was reversible after cathode purging for 20 h and cyclic voltammetry (CV) test, however the surface state of the cathode was permanently changed. A reduction of the electrochemical active surface (EAS) of the cathode, which contributed to the irreversible cell performance decay, was confirmed by cyclic voltammograms.

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