钴离子对硫酸中 PbO_2 电极的影响

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摘要：为研究钴离子对硫酸溶液中 PbO_2 电极电化学行为的影响机理，用循环伏安法、充放电循环实验、X 射线衍射技术和扫描电子显微镜技术研究了 PbO_2 电极的电化学行为和微观结构。结果表明：硫酸钴的添加有利于提高 PbO_2 电极的循环寿命与放电容量。尽管硫酸钴的添加同时会引起氧气的析出，但当硫酸钴的添加量不高于 6 mmol/L 时，这些不利的影响可以避免。钴离子影响 PbO_2 电极电化学行为的机理可能是充电过程中钴（Ⅱ）被氧化为钴（Ⅲ）离子后，与 $PbSO_4$ 发生氧化反应，有利于 β-PbO_2 的生成以改善正极活性物质中 β-PbO_2 与 α-PbO_2 的组成比例。

关键词：PbO_2；硫酸钴；电化学行为

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Effects of cobalt ion on the PbO_2 electrode in sulfuric acid solution

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Abstract: The effects of cobalt ion on the electrochemical behaviors of PbO_2 electrode in sulfuric acid solution were studied by cyclic voltammetry, charge-discharge cycling experiments, X-ray diffraction and scanning electron microscopy. Test results showed that in the presence of cobaltous sulfate, both the discharge capacity and the cycle life of PbO_2 electrodes were improved. Although the addition of cobaltous sulfate could cause the growth of oxygen evolution, these unfavorable effects could be avoided when the additional quantities of cobaltous sulfate were no more than 6 mmol/L in the electrolyte. The possible mechanism on the effects of cobalt-ion on the electrochemical behavior of PbO_2 electrode was that the addition of cobaltous sulfate could improve the ratio of β-PbO_2 and α-PbO_2 in positive active material during overcharge.

Key words: PbO_2; cobaltous sulfate; electrochemical behaviors