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研究论文

聚乙烯吡咯烷酮对PbO2电极微结构和性能的影响

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摘要： 采用电沉积法制备不同浓度聚乙烯吡咯烷酮(PVP)改性PbO2电极, 通过SEM、XRD、电化学阻抗谱(EIS)和线性极化(VA)等方法表征其微结构和电化学性能, 研究了PVP对电极电化学性能的影响。结果表明, PVP的包覆和空间位阻作用可抑制晶粒生长速度和团聚作用, 使电极表面晶粒细化均匀, 微结构得以改善; 改性PbO2电极具有更低的电化学反应电阻和更高的析氧电位; 适量的PVP掺杂可有效提高电极的电催化性能, 其中0.4 g ? L-1PVP改性电极的电催化活性最佳。最佳改性PbO2电极显示了良好的耐腐蚀性和电催化稳定性, 使用90 h后其降解率仍能达到81.5%。

关键词： 材料表面与界面 改性二氧化铅电极 聚乙烯吡咯烷酮(PVP) 电化学性能

Effect of Polyvinylpyrrolidone on the Microstructure and Properties of PbO2 Electrode

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Abstract: PbO2electrodes modified with different concentrations of polyvinylpyrrolidone (PVP) were prepared using electrodeposition method. The microstructure and electrochemical properties of the modified electrode were investigated using SEM, XRD, electrochemical impedance spectroscopy (EIS) and liner sweep voltammetry (VA) techniques. Results show that PVP molecules can be coated around PbO2 particles and can restrict their further growth and polymerization, which lead to a uniform and fine crystalline grains. The modified electrode presents a relatively lower charge transfer resistance as well as a higher oxygen evolution potential. Appropriate amount of PVP can enhance the electrocatalytic activity of electrode and the optimum doped concentration is 0.4 g • L−1. The modified electrode also exhibit excellent corrosion resistance and electrocatalytic stability. After having been used for 90 h, the degradation ratio of phenol can still reach 81.5%.

Keywords: surface and interface in the materials modified lead dioxide electrode polyvinylpyrrolidone(PVP) electrochemical properties

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