环境科学学报
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研究论文

郑辉,戴启洲,王家德,陈建孟.La-PTFE共掺杂二氧化铅电极的制备及其性能研究[J].环境科学学报,2012,32(2):282-291

La-PTFE共掺杂二氧化铅电极的制备及其性能研究

Preparation and electro-catalytic characterization of rare earth La-PTFE co-doped lead dioxide electrodes

关键词：二氧化铅 掺杂 电极 稀土

基金项目：浙江省自然科学基金(No.Y5090272);浙江省重点科技创新团队项目(No. 2011R09048-04); 高等学校博士学科点专项科研基金(No. 20113317120004)

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摘要：以Ti为基体,掺杂La_2O_3和聚四氟乙烯(PTFE),通过电沉积法制备了Ti/SnO_2+Sb_2O_3/PTFE+La_2O_3+β-PbO_2电极,并将所制备的电极应用于亚甲基蓝模拟染料废水的降解.结果发现,与常规的Ti/SnO_2+Sb_2O_3/PTFE+β-PbO_2电极相比,Ti/SnO_2+Sb_2O_3/PTFE+La_2O_3+β-PbO_2电极对亚甲基蓝及COD有较好的去除效果.含有La_2O_3活性层的Ti/SnO_2+Sb_2O_3/PTFE+La_2O_3+β-PbO_2电极在电解质浓度为0.15 mol·L^{-1},电极极距为6.0 cm的酸性条件下降解亚甲基蓝的效果最佳.降解3.0 h后,对100 mg·L^{-1}亚甲基蓝的去除率可达到97.92%,对COD去除率为93.39%.SEM结果显示,Ti/SnO_2+Sb_2O_3/PTFE+La_2O_3+β-PbO_2电极表面颗粒鲜明,比表面积增大,改善了电极的微观结构和催化效果.电化学测试表明,La_2O_3的掺杂显著提高了二氧化铅电极的析氧过电位,显示出较好的应用前景.

Abstract: Ti-based PbO_2 electrodes(Ti/SnO_2+Sb_2O_3/PTFE+La_2O_3+β-PbO_2)co-doped with La_2O_3 and PTFE were prepared by the electro-deposition. Compared with conventional Ti/SnO_2+Sb_2O_3/PTFE+β-PbO_2 electrodes, Ti/SnO_2+Sb_2O_3/PTFE+La_2O_3+β-PbO_2 electrodes have higher removal rate of methylene blue and its COD, in the process of degrading simulative dyeing wastewater of methylene blue. The results showed that the electrode doped with La_2O_3 (Ti/SnO_2+Sb_2O_3/PTFE+La_2O_3+β-PbO_2) had the best degradation efficiency under the acid condition with electrolyte concentration of 0.15 mol·L^{-1} and electrode spacing of 6.0 cm. The removal rate of 100 mg·L^{-1} methylene blue reached 97.92% and its COD value declined to 93.39% after degradation for 3.0 h. SEM showed that Ti/SnO_2+Sb_2O_3/PTFE+La_2O_3+β-PbO_2 electrode had clearer particles and larger surface that improved the micro-structure and catalytic effects of the electrode. The results of electrochemical test demonstrated that La_2O_3 doping can significantly increase oxygen over-potential of lead dioxide indicating good application prospects.

Key words: lead dioxide doped electrode rare earth

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